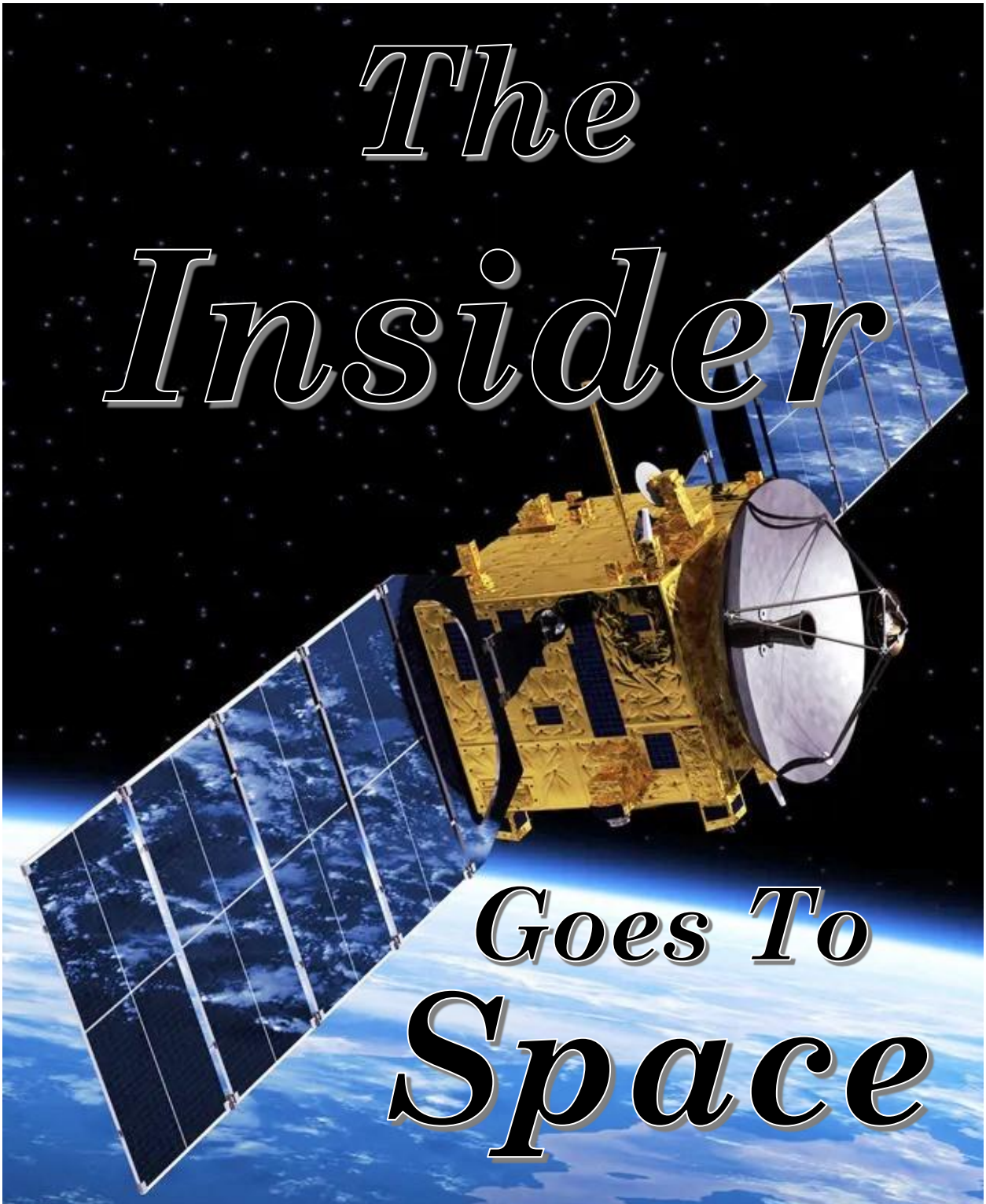
The Insider Goes To Space



Tales from Beyond Planet Earth

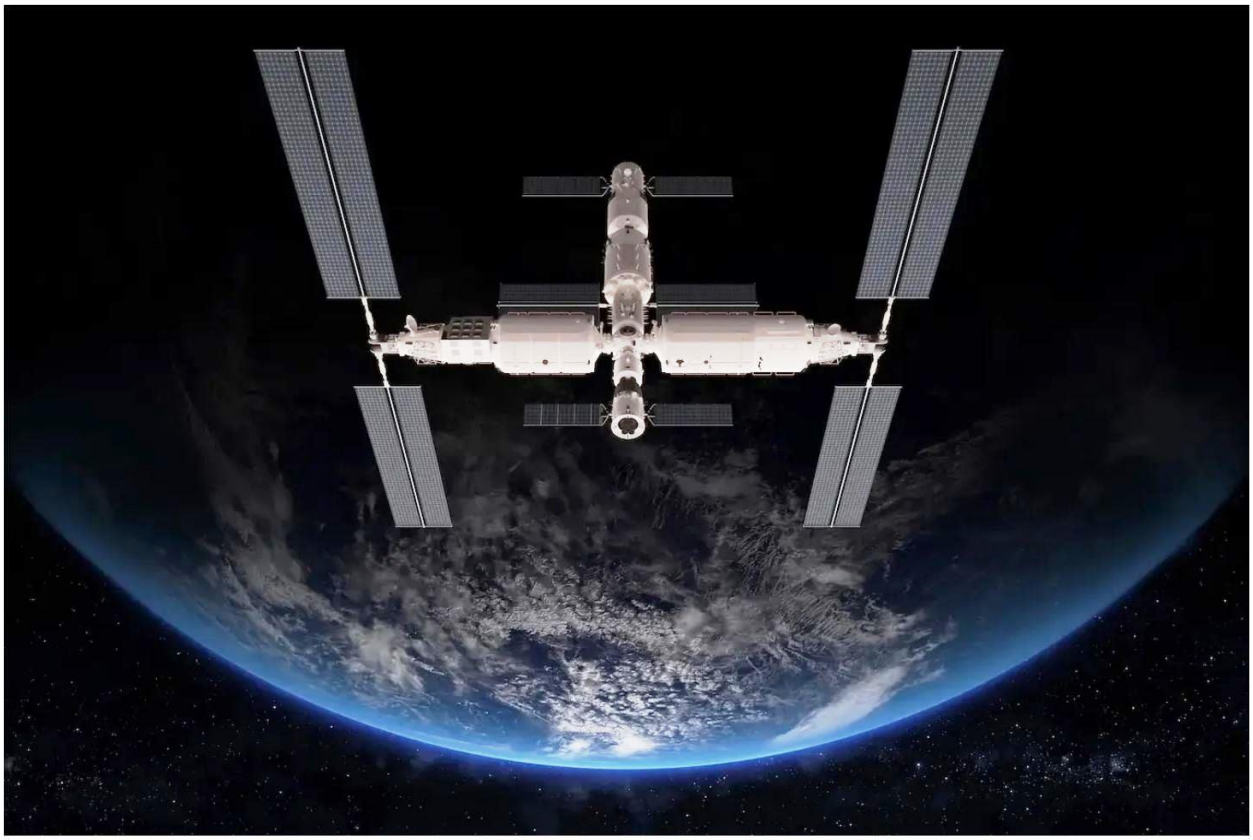
Yet another novel by Lefty Insider

About the Title

The Insider Goes to Space title is a sequel to the writers previous novels and follows Lefty the protagonists efforts to prevent the devolution of the now interplanetary Internet into an individualized and predatory surveillance system and a global societal menace. A menace whose parasitic effects threaten lives, freedom, and democracy. Remember that all of this started just because one homely, short, shy, fat, young, rich Jewish college kid could not overcome his own personal physical and mental deficiencies and didn't know how to talk to girls and couldn't find a date.

Target Market

This novel is targeted primarily to a demographic of 10 million college educated Baby Boomer aged men who are working in, or have worked in, the IT fields. The proposed goal of this manuscript is to reach one percent of this market, most of whom are disinclined to use social media, and find pdf files more accessible and readable than poorly formatted and weakly illustrated eBooks.



PHOTOGRAPH: XIA YUAN/GETTY IMAGES

Can you go out there?

Acknowledgements

Those involved in the creation of this book, know who they are and are much appreciated by this author.

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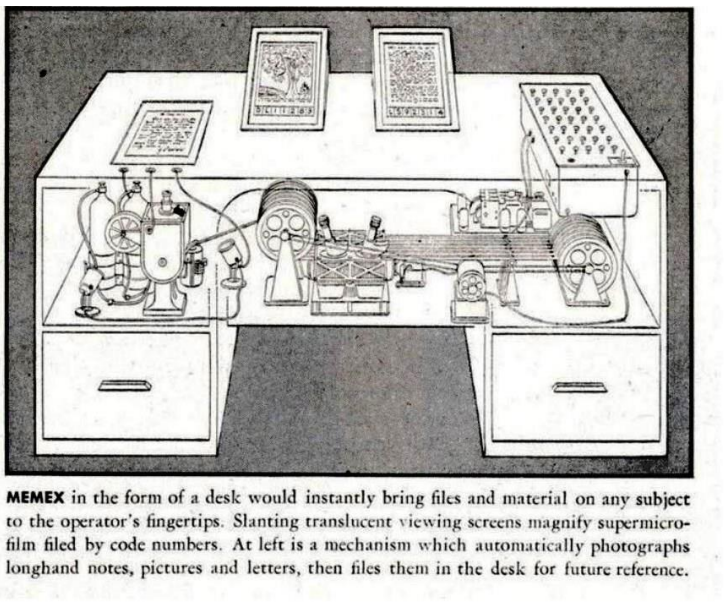
This book is a work of historical fiction. Apart from the well-known actual people, events, and locales that figure into the narrative, all names, characters, places, and incidents are products of the writer's imagination or are used fictitiously. All errors and omissions are the responsibility of the author alone.

ChatGPT 4.0 was used as a research assistant and no unedited AI generated text was used for this novel.

AI image generation, via OpenAI's Image Generator model, has also been used.

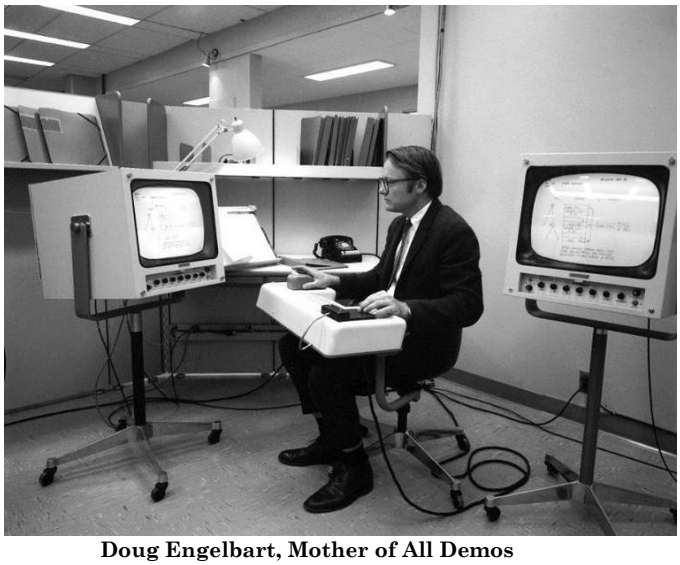
Inspirations



MEMEX in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference.

Memex desk, as portrayed in an illustrated Life magazine version of Bush's 1945 article "As We May Think"

https://www.tcw.org/lefty/Short Stories/As we may think-Vannevar Bush.pdf



Doug Engelbart, Mother of All Demos

Douglas Engelbart and his team at SRI, with funding from ARPA, unveil their experimental 'oNline System' at a computing conference in San Francisco in what will become known as the 'mother of all demos.' For ninety minutes, the stunned audience of around a thousand witnesses collaborative editing, videoconferencing, word processing, and a strange pointing device jokingly referred to as a "mouse." Every paragraph or other element in the NLS system can be linked to other elements using hypertext links. http://www.computerhistory.org/timeline/networking-the-web/#169ebbe2ad45559efbc6eb35720e4387

About the Author

I was born and raised in Wisconsin (Wisc). I am a veteran of the US Army U.N. Peace keeping force in South Korea, a former Peace Corps volunteer in West Africa and former Illinois high school and Community College teacher. My formal education includes a BS in Education, Occupational and Practical Arts, Vocational and Technical Specialties degree from the University of Illinois-Urbana/Champaign and Master's degree work in Adult Distance Education.

I have been involved in corporate technical service training and course development for International Harvester and JI Case companies, and publications with Dresser Industries.

I founded and operated a Tri-County business as President/CEO, involved in the sale and support of business computer systems, as well as specially adapted systems for the disabled. I was also the Founder and Executive Director of a statewide non-profit volunteer group dedicated to helping provide children with computer and Internet technology access. This agency refurbished and delivered many thousands of computer systems and provided Internet service as an ISP.

This authors novels are published on leanpub.com, articles on medium.com under the pseudonym Lefty Insider.

Lefty Insider resides in the beautiful farm and forest countryside of Wisconsin with his loving wife. I retired from active work a decade ago but continue to work with computer technology, reading, and challenging himself with new learning and self-directed pursuits. I work from a well-equipped interior and scenic exterior home office.

Insider Publishing, LLC

All the Creatures of the Forest Visit (Cardinal and lone yearling whitetail deer.

Synopsis

This Insider Goes Deep title is a sequel to the writers' previous three Insider books and follows the continued corruption (enshitification)[1] of computer operating systems and software programs in supporting the devolution of the original Internet into an individualized predatory surveillance system, corporate ATM, and a global societal menace whose parasitic effects, and predatory behavior threaten lives, freedom, and democracy.

Tired of fighting malware, data mining, and surveillance capitalism on planetary Internet, Lefty goes deep into the Deep Space Web to join up with like-minded geeks and to see what is happening there, and put an end to the worst of it.

Also from this author. The Insider titles are as follows:

Book One
The Insider (A Life Inside the Personal Computer)
Book Two
The Cozening (A Murder of Promise)
Book Three
The Insider Goes Deep (Tales from the Dark Web)
Book Four
A User Guide To The Dark Web (The 42nd and Final Encyclopedia Cyberspacia)
The above is a companion book to Book Three
Book Five
The Insider Goes Deep into the Spectrum
A quest to get the Megabits promised and paid for, "one sweet megabit at a time"
Book Six
The Insider Goes to Space
(Tales from Beyond Planet Earth)
Book Seven
The Insider Goes Deep into Broadband
(Broadband Internet Articles)
Book Eight
The Insider Goes Deep into the Legal System (
A Journey NOT for the Faint of Heart)
Book Nine
The Insider Goes Deep into the Consumer Protection System
(It's Worse Than You Think)
Book Ten
WiscSecureNet (WSN)
(It Is Time To Treat This State Like A Country And Button It Down)

Note: All books are available on leanpub.com

https://leanpub.com/bookstore?type=all&search=lefty%20insider

[1] *Cory Doctorow https://en.wikipedia.org/wiki/Enshitification*

A Note to Readers:

Throughout this book and the previous prequels, this writer chooses to write the term Internet with its original and intended initial capitalization spelling as a proper noun. This is also true for any outside imported text. The Internet is a person, place, or thing and as we were all taught in grade school, requires proper capitalization. The trend in current print and online spelling as *lower case, which* is disrespectful to its founders and creators in my view. It is this writer's view that this intentional diminishment, via the lower case spelling, of this technological wonder and gift to humanity, is part of an effort by Corporate America to assimilate it into their Corporate Borg. I don't really care if this insult is included as a rule in the Associated Press Style Guide, or APA Style Guide.

To the Internet founders, decentralization was the main idea, and not the current walled gardens of Google (Alphabet), Apple, Amazon, Microsoft, and Facebook. While original pioneers like Vint Cerf and Bob Metcalfe, etc. may have been assimilated into the corporate Borg, people like Jon Postel and Tim Berners-Lee never were. Anyway, this writer gets to decide such things.

Non-original text formatting conventions

Text coming from "websites" will be formatted thus.

Text coming from "Wikipedia" will be formatted thus.

Text coming from "News" sources will be formatted thus.

There are no Endnotes and Footnotes are shown at the bottom of pages.

Note: this book is best read with a pdf reader and not a web browser, in Read Mode, and in portrait orientation, which allows for both page turning and to zoom in on the graphics contained within. A 1600x900 or higher screen resolution on a 24 inch portrait monitor is recommended.

Note: any typos in correspondence or textual material not originated by the author remain uncorrected for accuracy.

This book and the entire collection represent this writer's lifetime opus in the form of an extended modern day bildungsroman representing more than ten years of writing work and more than fifty years of research and life experience. As with the previous books in this series, this one is part invented fiction, part historical fiction, part textbook, and part actual journalism.

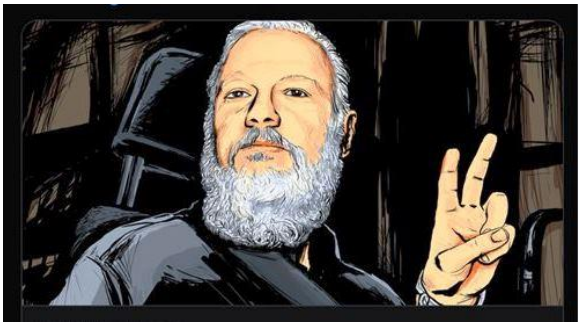
These books are what Americans may call *edgy* or *anti-establishment* and contain what the writer's Germans ancestors might call *Sturm und Drang*.[2]

A hyperlinked TOC has been created, and included, but not an index as pdf files are easily searchable.

[2] *A late 18th century German literary movement characterized by works containing rousing action and high emotionalism that often deal with the individual's revolt against society*

Dedication

The book is dedicated to Julian Assange whose aspirational goals and inspirational acts provide life lessons to us all.



Images of Ecuador's ambassador inviting the UK's secret police into the embassy to drag a publisher of--like it or not--award-winning journalism out of the building are going to end up in the history books. Assange's critics may cheer, but this is a dark moment for press freedom.
https://t.co/ys1AIdh2FP
— Edward Snowden (@Snowden) 11 April 2019

Readers are encouraged to become fully informed:
http://www.tcw.org/All Assange Evidence Files Compilation.pdf

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Preface

What follows is an excerpt from the 2025 Cory Doctorow book Enshittification: *Why Everything Got Worse and What to Do About It*

Case Study: Facebook

Stage One: Good to Users

Facebook is the perfect place to start. Facebook is a service that Mark Zuckerberg started in his dorm room so that he and his creepy pals could non-consensually rate the fuckability of their fellow Harvard undergrads.

It was Zuck's users who figured out how to make something great out of this inauspicious beginning. They filled up the vessel with themselves and with connections to one another, forging bonds. It was a compelling experience, so much so that many people called it addictive.

But Zuck was determined to bring Facebook back to its origins: a service that treated people as means, not ends— as something for the platform's managers to toy with and, ultimately, abuse.

When Facebook started, it was available only to American college kids. They loved it, and investors saw potential: with all these users piling it, there would be innumerable opportunities to sell things to them. Hell, you could sell users to one another. Investors poured money into the business. In 2006, Facebook decided to spend some of its investors' cash to expand to the general population, so it dropped the requirement for users to sign up with the .edu email addresses that only American college students, faculty, and personnel can get.

Back in 2006, Facebook made a simple and compelling pitch to those new users it was hoping to lure onto the platform: Sure, we understand that most of you already have a social media service that you enjoy using called MySpace. But has it occurred to you that MySpace is owned by an evil, crapulent, senescent Australian billionaire named Rupert Murdoch, and he spies on you with every hour that God sends?

Come to Facebook, where we will never spy on you. All we ask of you is that you create a Facebook account and then "articulate your social graph" by telling us which other users you want to connect to you. Then, we will create an automated custom feed, consisting solely of the things that the people you follow have posted for consumption by their followers.

This is a pretty good deal. You aren't imagining it: Facebook was fun and useful and valuable, once upon a time.

That was stage one: Facebook had a surplus (its investors' cash), and it allocated that surplus to its end users by subsidizing a feed of things that users wanted to see, rather than things that businesses would pay to show them.

To sweeten the deal, Facebook gave MySpace refugees a way to eat their cake and have it, too: a bot. Once you joined Face-book, you could give that bot your MySpace login and password, and then, several times a day, the bot would log in to MySpace on your behalf, scraping all the messages your friends there had left for you and pasting them into your Facebook inbox. You could reply to those, and the bot would push them back out to MySpace on your behalf. That way, you didn't have to choose between Facebook's superior user experience and the friends you left behind on MySpace.

So users piled in, and they proceeded to lock themselves into Facebook's platform. There are lots of ways for digital businesses to lock in their users, but with social media, they don't even have to try.

Most online businesses enjoy high network effects. This is the economist's term for a product or service that gets more valuable as it attracts more users. You joined

Facebook because the people who were already there made it valuable to you, and once you were there, you made Facebook more valuable to the people who wanted to hang out with you.

But Facebook doesn't just benefit from large network effects; it also relies on high switching costs.

Switching costs is another useful piece of economics jargon.

Switching costs are everything you have to give up when you switch from one product or service to another.

In the case of Facebook, the switching costs of leaving Facebook include the company of everyone you hang out with there, because they'll still be on Facebook and you won't be.

Now, hypothetically, you can avoid this switching cost. If you can convince all the people you like on Facebook to quit at the same time as you and transition to a new social network where you can all reestablish your links, you can leave Facebook and keep your friends.

Here's where the collective action problem comes in. That's our third and final piece of economics jargon: the collective action problem is the incredibly difficult business of getting other people to do what you want them to do, when you want them to do it.

You experience the collective action problem on a small scale all the time. You know that group chat with half a dozen friends in it? Remember how hard it was to decide what movie or bar to go to, or which board game you should all play? Even when you all agree that you want to do something together, it's hard to agree what to do and when to do it. That's the collective action problem.

Adding people to the group makes the collective action problem exponentially more problematic. Once you're established in a Facebook community with a couple hundred friends, you have to convince them all to leave at the same time as you, and go to the same place as you.

But all those friends have their own groups of people they can't afford to leave. Maybe they're in a support group for people with a rare disease. Maybe they use Facebook to organize their kid's Little League carpool with the other parents. Or maybe that's how they stay in touch with the people they left behind when they emigrated. Maybe it's where their customers are.

To get your friends to switch away from Facebook, you not only must convince them that it's time to go and that you've got the right place for them to go next—you also have to convince them to talk all those other people into leaving, too; or you have to convince them to endure the switching costs of leaving their own groups behind.

So Facebook users can't help but take one another hostage, and Facebook grew progressively more cognizant of this fact.

Once it sensed that a critical mass of its users were locked in to its platform, it was time for stage two.

Stage Two: Good to Business Customers

Facebook understood that it could make money from two groups of business customers: advertisers and publishers. There was only one problem: to make the service valuable to them, Facebook would have to reduce the value enjoyed by its users.

So Facebook started to claw back the surplus from those end users and began doling it out to advertisers and publishers. Facebook approached its advertisers and made a pitch: "Hey, do you remember when we told these rubes that we wouldn't ever spy on them? We were lying. We spy on them from asshole to appetite.

If you give us a remarkably reasonable sum of money, we will use that surveillance data to do extraordinarily precisely targeted advertising on your behalf. What's more, we are such upright, good- natured slobs that we have filled a whole building with engineers who labor day and night to fight ad fraud. If you give us a dollar to show an ad to a specific kind of person, you can be sure that ad is going to be shown to the right person."

Then, Facebook approached publishers and made a different pitch: "Hey, do you remember when we told these rubes that we would only show them the things they asked to see? That was a total lie. If you post short excerpts from your own website content to your Facebook account, complete with a link back to that website, we will non-consensually cram those excerpts into the corporate messaging eyeballs of users who never asked to see them. You will get a free traffic funnel that you can monetize as you see fit."

So the publishers and the advertisers piled in, too, and they became dependent on the users— the users who were sticking around because they were dependent on one another, the users who took one another hostage— which meant the publishers and advertisers were now held hostage, too.

Now it was time for stage three of enshittification: putting the screws to the business customers.

Stage Three: A Giant Pile of Shit

For advertisers, this took the form of rising prices and plummeting ad fidelity, along with skyrocketing ad fraud. Gradually, Facebook ramped up the price of targeting an ad to its users, but it also took less care to show ads to the users advertisers had selected.

Meanwhile, ad fraud was going wild. Advertisers were paying billions for ads that no one ever saw. In 2018, Procter & Gamble zeroed out its $200 million annual "programmatic advertising" budget and saw no decline in sales.§ It seems all of those ads were either:

a. Being shown to random people rather than the people P&G was paying to target; or

b. Not being shown to anyone.

It wasn't any better for publishers. Gradually, Facebook's content recommendation algorithm started to require longer and longer excerpts in order for posts to qualify for being shoved into strangers' feeds. The system also started down ranking shorter excerpts in subscribers' feeds, meaning that publishers had to push longer and longer excerpts onto Facebook's platform in order to be seen at all. The longer a post was, the more substitutive it was for the whole article.

Eventually, publishers were corralled into publishing their whole articles on Facebook, and then, to add insult to injury, Facebook started to suppress posts that linked away from its site, on the grounds that such links might be "malicious." Worse, even whole articles with no links were often suppressed, even for followers, and publishers had to pay to "boost" their content in order to have it shown to the people who'd explicitly asked to see it.

At this point, the publishers had been converted to commodity back- end suppliers to Facebook, and their main path to monetization was Facebook's own rigged ad marketplace.

Meanwhile, for users, things kept getting even worse. Facebook dialed down the quantum of content from the people you chose to follow and wanted to hear from to a mingy, homeopathic residue, leaving behind a newsfeed void that the algorithm could fill with content people paid to put there: ads and boosted content.

This is stage three of enshittification: Facebook has now withdrawn all available surplus, leaving behind the bare minimum it calculates to be sufficient to keep users

glued to one another, and publishers and advertisers glued to the users. Every available penny of surplus has been clawed back and given to Facebook's shareholders and executives.

But this is a very brittle equilibrium. The difference between the user who says, "Goddamn I hate this place, but I can't stop logging in to it," and the user who says, "Goddamn I hate this place, and I'm never coming back" is razor- thin.

All it takes is one whistleblower, one Cambridge Analytica– style privacy scandal, one livestreamed mass shooting, and users bolt for the exits.

Every time that happens, Facebook learns that network effects are double-edged swords. The users who can't leave because they can't bear to part with their friends have no reason to stay after those friends depart. Once the exodus starts, it tends to accelerate.

Investors certainly understand this. Any bobble in Facebook's growth— let alone a contraction in Facebook's user numbers—triggers shareholder panics. In the first quarter of 2022, Facebook posted lower- than- projected US user growth, and the stock market responded with a mass sell- off, dumping $250 billion worth of Facebook shares in twenty- four hours, at the time the largest decline in any corporate valuation in the history of the human race.

When their company's fortunes turn uncertain, tech leaders panic. Being techies, they have a technical name for this panic: they call it pivoting.

Facebook's pivot was decidedly weird. Mark Zuckerberg addressed the world and said, "Look, I know I've spent the past decade insisting that the future would consist solely of you arguing with your racist uncle using a primitive text interface of my own devising. But I have had a revelation. It turns out that the future really will involve me converting you and everyone you love into a legless, sexless, low- polygon, heavily surveilled cartoon character in a virtual world called the Metaverse, which we ripped off from a twenty- five- year- old dystopian, satirical cyberpunk

novel."

That's end- stage enshittification, the stage at which a platform turns into a pile of shit. Facebook isn't the first platform to reach this stage, but it has managed an improbably prolonged period of shambling continuation, long past the date when we should have put it into the ground.

That's what distinguishes enshittification from "tech companies turning awful and going out of business." All our tech businesses are turning awful, all at once, and they're not dying. We remain trapped in their rotting carcasses, unable to escape.

I'll explain why that is in Part Three, and in Part Four, I'll explain what to do about it.

Prologue

Science Fiction, or have we heard our last warning?

In the year 2058, four mega-corporations dominate the world. Government structures are falling apart, government leaders are degenerating into marionettes of the corporation executives, and capitalism is turning ever more ruthless. Large parts of the world have become uninhabitable due to environmental disasters, wars, and climate change. Major cities have become hellholes where disease and crime are on the rise. The NAGER plague has killed over forty percent of humanity, and its origins are still baffling scientists today. A small number of wealthy citizens have barricaded themselves in gated communities and corporate arcologies[3], keeping social ills away through money and influence. In times when both petroleum and fresh food are in short supply, technological advances are reserved for them and their wage slaves.

Cyber implants and prostheses called 'augmentations' improve the bodies of those who can afford them while leaving others jealous. Private security firms have largely taken over responsibility for dealing with social unrest and the ever-more-rampant violence. Corruption and police violence are just as prevalent and unpredictable weather, organized crime, and drug use.

In space, meanwhile, corporations have explored the solar system and established outposts on the Moon and Mars. Even the distances to the moons of Jupiter and Saturn are being overcome at great financial expense, to satisfy an overcrowded Earth's growing hunger for resources. Corporate greed knows no bounds, even in the vastness of space. In particular, one astronomer's discovery of a long-suspected ninth planet beyond Neptune has caused a space race between the great powers. It has left researchers puzzled while giving corporations a new target for displaying their prestige, and more opportunities for maximizing profits. At the same time, in war-torn Los Angeles, a significant section of the population is suffering from poverty and disease. After the strongest earthquake ever measured in human history, the megacity has been divided in two by a kilometer-deep chasm. From this sectioned-off hell on Earth, referred to as 'Hell's Mouth,' toxic gases rise and poison the climate of the city. On the streets beyond the inner city, life is lived by the law of the jungle, and groups of mercenary soldiers called 'mercs' secretly work for the highest bidders, stealing from and blackmailing competing companies and snatching their best employees.

Calvert, Joshua T. Ganymede Rises. Kindle Edition.

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[3] *a concept of architectural design in which an ideal city is contained within one immense vertical structure, thereby reducing wasteful consumption and preserving the natural surroundings:. Dictionary.com*

Forward

“I'm old enough to remember when the Internet wasn't a group of five websites, each consisting of screenshots of text from the other four.” Tom Eastman, New Zealand software developer

“The Internet has become an advertising delivery network, yet unlike the cable TV advertising delivery networks that provide profits to ABC, CBS, CNN, FOX, MSNBC, and NBC, primarily, to one that benefits AMAZON, APPLE, FACEBOOK, GOOGLE, AND MICROSOFT” Lefty Insider (Author)

"Before the personal computer era I was taught in high school that a lathe was the only tool that could be used to recreate itself. Now since then, that is also true for a personal computer, but certainly not for a smartphone. Can you design and/or manufacture a smartphone motherboard with a smartphone? Think about it." Lefty Insider (Author)

Unfinished business

Before we begin this latest Lefty saga, a word about the ending of the previous book The Insider Goes Deep into the Spectrum.

After battling the incompetence of a local county court clerk trainee, and the incompetence or perhaps obstruction of another distant county clerk trainee, (resulting in a second mailing) the Small Claims court Summons and Complaint was served by a distant Sherriff’s deputy successfully.

However this delayed the court date by a month as the postal service required six days, with very expensive priority mail, to find the Sheriff’s office and deliver the paperwork in the distant county seat the second time. To their credit they did find and deliver it in three days the first time, via less expensive registered and certified mail.

Small Claims Court rules against due to lack of sufficient evidence after ruling against Motions to allow and compel witness testimony and discovery evidence. The Circuit Court then dismissed this case due to the courts misunderstandings, and factual errors.

The WI Appeals Court ruled against despite these factual and legal precedent errors by the lower court, and also dismissed an Appeal for Reconsideration without comments.

The WI Supreme Court has rejected his petition to send the case back to the lower court.

Epigraph

Facebook, now Meta, having had all of their datacenters destroyed (See Book Three, The Insider Goes Deep) then decided to beam their democracy destroying, predatory and parasitic surveillance software tool to all parts of the earth from space.

The current dystopic fate of liberal democracies around the globe and oppressed peoples planet wide now resulted from this selfish decision of his to steal an idea from some other Ivy League rich kids and convince still others to help write a piece of software to solve *his* problem. The Insiders just could not allow this fate to prevail, as they believed that their space station was just a jumping off point to place their datacenters on the moon and beyond.

"Facebook creates and uses algorithms and can change them over time. But that is not how it works. They set the algorithms off and they learn and change and run themselves. Facebook intervenes in their running periodically, but they really don't control them."[4]

But before we go into that adventure, for the sake of clarity your indulgence is required in this epigraph form, to complete what was left unfinished in the previous book.

Relevant ending excerpt from *The Insider Goes Deep*

"They designed and implemented an EMP attack, to kill all the terrestrial Facebook global datacenters simultaneously and permanently to make sure Facebook never celebrated a 20th Anniversary.

With Facebook now destroyed, they could focus on continuing to build Web 4.

To be continued…

Note: The source and methods of the previously mentioned EMP attack have not be revealed for personal security purposes until now.

Electromagnetic Pulses[5] or EMP's can be artificially created by forcing neodymium magnets through super conducting coils with chemical explosives and tuned to specific frequencies to reduce the power requirements and increase the operational range. This allows for the transmission across national terrestrial fiber and oceanic cables around the world. These magnets are vaporized in the process, however the electrical magnetic current generated (POE)[6] can be sent via twisted pair or optical fiber cables through routers, switches, and servers. These EMP signals can range from up to 100 volts and 250 watts delivered via a modified 4PPoE injector[7]. This signal will electrically destroy everything in its path along the Ethernet cable path within the packets specified IP address range. The EMP is triggered at each network interface connector, or NIC, when current flow stops due to the electrical overload and subsequent physical damage. A time delay is in fact created to get through routers

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[4] Devil in the Stack: Searching for the Soul of the New Machine, Andrew Smith, Atlantic Monthly Press

[5] An electromagnetic pulse (EMP), is a brief burst of electromagnetic energy. The origin of an EMP can be natural or artificial, and can occur as a conducted electric current. The electromagnetic interference caused by an EMP can physically damage objects such as electronic devices and computers. Wikipedia

[6] Power over Ethernet, or PoE, is a networking system that passes electric power with data on Ethernet cabling. 4PPoE provides power using all four pairs of a twisted-pair cable, which enables higher power. Wikipedia

[7] Passive PoE devices usually run on 18 to 48 volts DC. If the wrong voltage is connected, it may cause permanent electrical damage to the device.

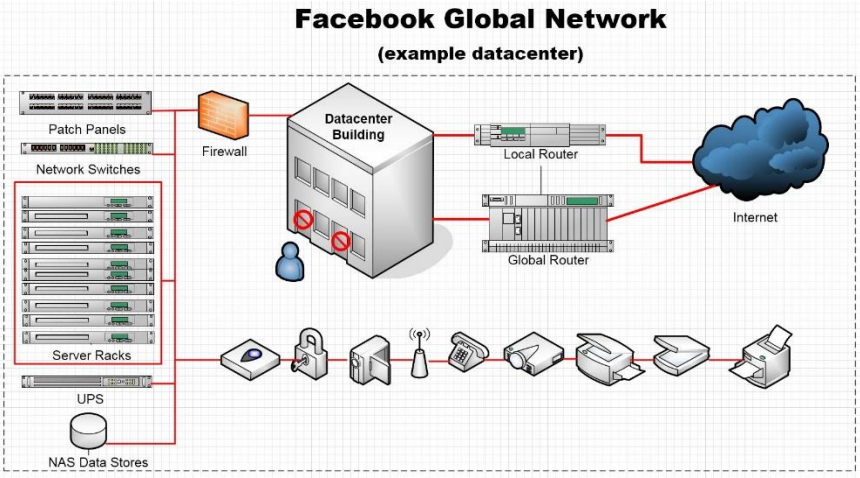
and switches as electricity follows the path of least resistance, hitting the server end points first, followed by the switches local, uplinked, and global, port by port, and finally the global and local routers. All other network connected devices, hardware firewalls, UPS's, projectors, printers, plotters, scanners, photocopiers, IP phones, fax machines, security cameras, wireless access points, door security locks, etc. will also be destroyed.

In the aftermath, Facebook will be deaf, dumb, blind, and looking stupid as their employees are standing outside of, and locked out of their mostly unmanned datacenter buildings. This allowed for worldwide destruction of all things Facebook.

All computers Ethernet hardwired to Facebook were impacted by this rogue destructive signal. Wireless and cellular connections are not impacted, primarily to protect American citizens mobile phones and users in the developing parts of the world.

Those who remained hardwired despite many, many, warnings to delete Facebook will now reap the consequences of this willfully ignorant, psychopathic, uncivilized and socially unacceptable behavior.

We also decided to fly some video drones over some of the largest datacenters to forever memorialize the chaos occurring there for the TV News, podcasts, and websites. And of course for the lol's.



Datacenter servers include, front backend, database, load balancing, and cache servers

So how did this all happen you might ask, that a group of miscreants and malcontents could totally take down a *mega* corporation like Facebook.

Note: Front servers serve the html and JavaScript to the user. Backend servers serve the requests from the front servers. Data servers serve any source of data required. Load balancing and cache servers are provided based on the volume of traffic.

Well, it went something like this simple idea:

Build an EMP machine under the Burning Man "Man" at the annual festival and use the dark fiber from the Blackrock desert in Nevada to California to kill Facebook. most of all the fiber laid, mostly in the early 2000's, in the US is currently dark, meaning unlit and unused.

AT&T, Verizon & CenturyLink "Dark" and "Lit" Fiber Optic Miles, as of December 2007

	Miles of Fiber	Percent
LIT	14,602,853	33.8%
DARK	28,589,056	66.2%
TOTAL	43,191,909	

(Source: FCC: December 2007)

IRREGULATORS

The remote location of the Blackrock Burning Man desert about three hours north of Reno, Nevada, basically where the roads end and turn into dirt. The group had been there a few years earlier in Willie Nelson's tour bus while beta testing and introducing the RealOS and had a great time.

So we got the award winning band back together, from Book Two "The Cozening", for this project, rather than use the misfits from the Dark Web. As a refresher for previous readers or a baseline for new ones, the cast of characters are:

Amii – is a mother with young daughters, who is a computer-programming hobbyist, with interests in anime and heavy metal music. She likes family time, PC's, and chats on IRC with tech heads. She dislikes most people and phones. Amii also uses the ami32.dll, AmiMizunoGS, and pUnknown in online profiles.

Colakid – honor graduate, retired residential builder. Quit his Canadian computer company to allow time for enjoyable things. He likes Jolt cola and landscaping mulch. He dislikes people who slander others for standing up to the reality of Windows 10 and 11.

Dozrguy – is a Dakota computer enthusiast and computer system builder. He likes Harleys, operating heavy equipment, Michigan Mary, and Linux, in that order. He dislikes Win10/11.

VJJ – or the professor as the group knew him. He was a visiting guest lecturer from Eastern Europe working at MIT, before the banishment. He likes user experience analysis, GUI design, & programming. He dislikes Metro, Modern, or Universal interface apps. He has limited active English skills.

JNC – aka "Cool Hand", aka the first A.User, software engineer. He runs a US graphic design business in Florida. He likes high performance cutting-edge graphics and image processing software. He dislikes ugly poorly written surveillance software like Win10/11.

Preferreduser – is an experienced user, and hardware engineer from California. He likes using and building computers, and well told stories. He dislikes programming and developing.

BBBB – (Big Bad Bombastic Bob) is a highly skilled programmer, who runs a west coast software engineering company. He likes old school software developing, creating music. He dislikes touch screens, (due to fat fingers and presbyopia), Dot Net, and Windows 10/11.

Hwrx – is an older wise programmer. Aka GoNonpro. He is old enough to know that President Ford fell down often. He lives in the Pacific Time zone. He likes old cars, cartoon animation, good UI's. He dislikes Windows 10/11.

Mt – posts most messages using the phrase, "W10/11, and Start8 have no issues; I will be upgrading my fleet." He likes Start8 and Firefox He dislikes Win10 and Spartan/Edge.

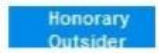
Michigan Mary – is a designer, color coordinator, programmer, and all around good egg. She likes Dozrguy and Harleys. She dislikes Windows 10/11.

Nigthhawk – Programmer extraordinaire. He likes gaming. He dislikes Windows 10/11.

Renee – is a serious software developer, with expertise on OS development. She likes computers and VMS. She dislikes sloppy programming, and Windows 10/11.

Michael Masters – was on DARPANET in the 80's, and is now medically retired. He likes Ronald Reagan. He dislikes living in Dallas where there is no spring or fall, just 5 months of heat and then cold for the rest, and of course, Windows 10/11.

Mike Kerbin – is from the north UK Yorkshire, and moved to sunny Portugal to retire. He likes being retired and good software. He dislikes Windows 10/11.



Lefty – is a business entrepreneur, long time computer system builder, refurbisher, and humanitarian. He likes telling stories, rock and roll music, baseball, and computers. He dislikes stupid people, slow computers, social media, and bad software.

The Guy Fawkes Mask Group

Hula_Baloo – is a retired, scientific application programmer, system programmer, systems engineer, and software architect. He likes installing classroom computers, troubleshooting them, and volunteering to teach Windows classes in his spare time. He dislikes Windows 10/11.

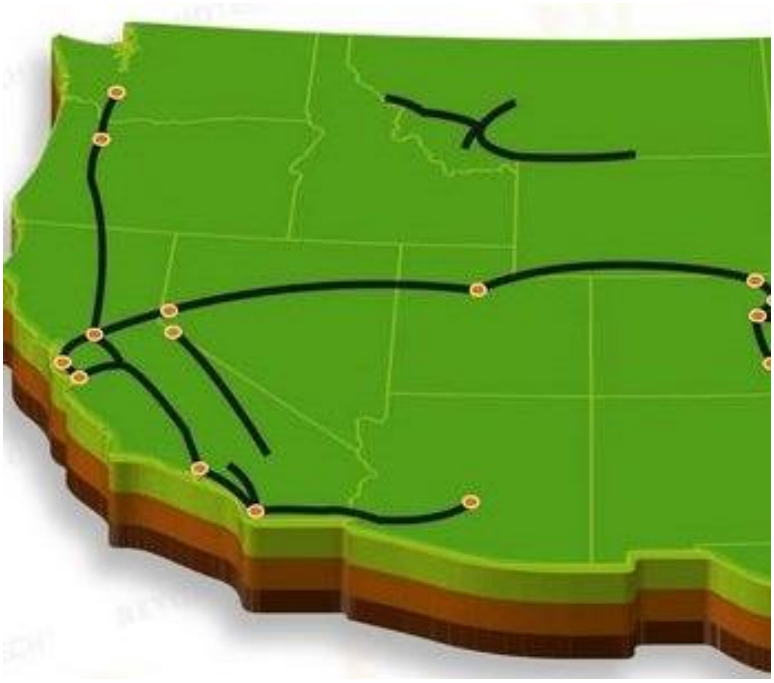
CrazyKats – is a solid technician who helped in getting the user interface on the email client right. He likes UX and UI design and has unique insights in being able to view things from the user's perspective. He really dislikes Windows 10/11.

FredWilson_905, aka WilN937 – is a solid programmer who helped create the email protocols to control encryption past the first hop from a client to its configured outgoing mail server. He likes maintaining email encryption all the way to the end user. He dislikes Windows 10/11 and unencrypted communications.

Techie007L – is a key windows programmer who headed up the Dark Mail project. He likes classical music and playing the violin. He likened using Windows 10/11 to masturbating with a cheese grater.

As it turns out that there is some dark fiber, much of it laid during the dot com boom, just before the dot com bust. Some of it follows Interstate 80[8] in the vicinity of the Blackrock desert in Nevada. So it jumped out at us that yet another visit to Burning Man[9] is in order. This visit, its important location and resulting ceremony would be critical to us pulling this caper off. No metals were anticipated this time.

So the 2000 mile trip to get there will follow I-80, a modern day coast to coast Route 66, to Nevada with some stops along the way, of course. We begin at Joliet, Illinois and travel to Des Moines, Iowa to Omaha Nebraska to Cheyenne Wyoming to Salt Lake City Utah and finally to Reno Nevada and on to the desert.



Dark fiber locations

The first leg of the trip

The trip would be funded (food and fuel) by the EFF, in liaison with Micah Lee, EFF's technologist, web developer and hater of Facebook as well as a technology reporter for The Intercept website. We would meet him at the event.

The Electronic Frontier Foundation (EFF) is an international non-profit digital rights group based in San Francisco, California. The foundation was formed on 10 July 1990 by John Gilmore, John Perry Barlow and Mitch Kapor to promote Internet civil liberties.

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[8] *Interstate 80 connects two major US cities—San Francisco and Teaneck, New Jersey*

[9] *Burning Man is an event focused on community, art, self-expression, and self-reliance. The name of the event comes from its culminating ceremony: the symbolic burning of a large wooden effigy, referred to as the "Man", that occurs on the ultimate night. Wikipedia*

From a Dark Web search, the group discovered that an RV dealer in Joliet, IL was looking for someone reliable and honest to transport a million dollar 45 foot Class A motorhome from his shop, Las Zenow's RV's (he was formerly the chief librarian of the Imperial Library of Trantor), to Reno, NV. We struck a deal over email and phone that we would deliver the vehicle fully intact (within 42 days) at no charge. In return we were allowed to use it for a week at the Burning Man Festival festivities.

Story on how we were loaned this.

This unit will sleep eight and have plenty of room for entertainment and laptops.

As with the last adventure the Guy Fawkes Mask Group will meet us in Nevada and bring much needed supplies, tech, and labor.

Relative of group?

BBBB would meet us there but made a point to reminds us that he really disliked what he called the *dirty hippies* who would attend the annual event.

A real beast

Luxury to the max with a shower, full kitchen, bathroom and bedrooms

We first had to first make a stop along the way to have the RV fitted with solar panels to reduce the necessity of running the 5kw generator and to help offset the carbon footprint of the RV's 600 horsepower biofuel engine.

At this time we would also have the Starlink for Mobile Internet for RV's with the new one inch thick Dishy McFlatface dish installed provided for 300Mbps Internet connectivity.

And of course a trailer hitch for pulling a motorcycle.

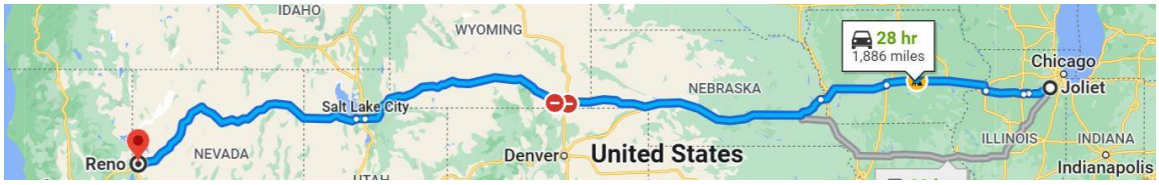
They grilled brats, burgers and such for meals on the top of the line outdoor kitchen.

We would meet along this road trip to pick up Dozrguy, and of course Michigan Mary was in on the plan.

The planned meeting location would be

The Trike at his ranch in North Dakota

Dozr had traded in his *Harley* and sidecar (not called a motorcycle or a bike) from Sturgis for a Trike model but had on a new electric model on order complete with futuristic jet sounds he said, "so people could hear you coming. Besides it sounded kinda cool."



The second leg of the trip

We justified the fiber laying across the playa floor to BM management by providing free fast Wi-Fi to all attendees gratis, courtesy of Facebook of course.

Photos of laying fiber in a desert

We recruited some volunteer helpers to lay the cable across the desert playa.

They would build their EMP generating explosion under the Man at the finale of the Burning Man festival, thereby disguising this explosion during the final Sunday night event.

But first Neil Young, who when told about our plan, agreed to come and perform extended length 20 minute versions of his songs Ordinary People with the tremendous horn section, The Bluenotes (Ten Men Workin) and Ramada Inn.

Lefty exclaimed "Let's light this candle".

The group then all retired to their RV to watch the drone feeds from around the world, before they all faded back into obscurity.

After seven days of celebration and debauchery for the 70,000 attendees, a time-honored ritual was performed. This involves turning towering wooden giants into ashes, the 37th effigy since the very first man was burned in 1986,

Since 2017 Facebook has been using the MAREA transatlantic cable, owned by Telxius of the Spanish telecom Telefonica. This 4,100 mile cable connects the Ashburn,

Virginia NAP (May-East) to Bilbao, Spain with terabytes of bandwidth and speeds that are about 16 million times faster than the average home Internet connection.

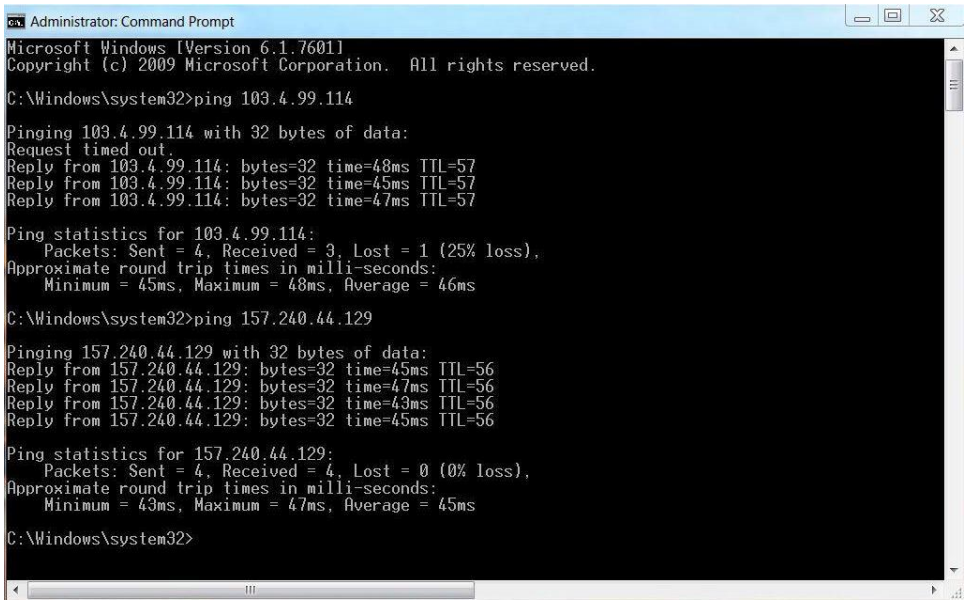
Facebook's undersea cable in the Pacific Ocean is called Tierra del Mar, which lands in Hermosa Beach, California, on the ocean just southwest of Los Angles. It is used to make its South East Asia connection. In a single second, its six fiber-optic pairs, stretching roughly 13,000 kilometers (8,000 miles) between Hong Kong and Los Angeles, is able to send some 144 terabits in both directions.

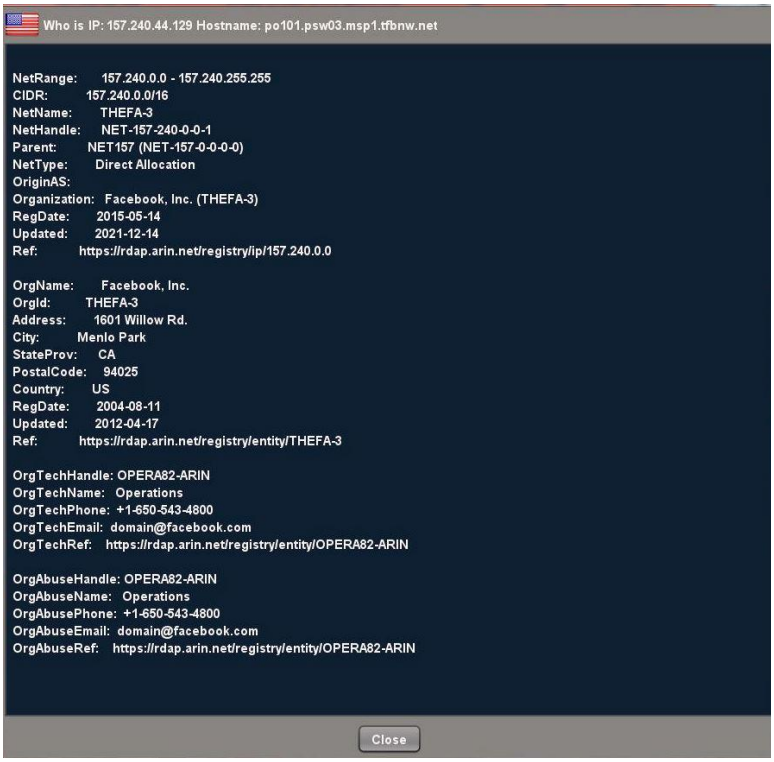
Ping and tracert Facebook show results
103.4.96.0 - 103.4.99.255 Menlo Park, CA
129.134.0.0 - 129.134.255.255 Menlo Park, CA
147.75.208.0 - 147.75.223.255 Facebook Israel Ltd
157.240.0.0 to 157.240.255.255 Menlo Park, CA
173.252.64.0 - 173.252.127.255 Menlo Park, CA
185.89.218.0 - 185.89.219.255 Dublin, Ireland

Dark fiber lit up when connected

So we first establish the IP address range for facebook.com. (interestingly listed as tfbnw.net or in the original name of thefacebook.)

We tap into the dark fiber and with and by pinging packets to facebook.com we get a response.





8	Singapore	(Unknown)	1.3673	103.8014	103.4.99.114	ae16.pr01.msp1.tfbnw.net	58	128	15536
9	United States	(Unknown)	37.751	-97.822	157.240.44.129	po101.psw03.msp1.tfbnw.net	54	175	15147
10	United States	(Unknown)	37.751	-97.822	173.252.67.115	(None)	38	119	0

```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Windows\system32>tracert facebook.com

Tracing route to facebook.com [157.240.26.35]
over a maximum of 30 hops:

  1    16 ms    16 ms    16 ms  192.168.1.1
  2     *        *        *     Request timed out.
  3    25 ms    24 ms    23 ms  lag-62-10.dtr01twrvwi.netops.charter.com [96.34.25.20]
  4    39 ms    40 ms    38 ms  lag-204.crr01stptwi.netops.charter.com [96.34.30.25]
  5    35 ms    43 ms    33 ms  lag-400.crr01euclwi.netops.charter.com [96.34.24.83]
  6    87 ms    34 ms    34 ms  lag-101.bbr01euclwi.netops.charter.com [96.34.1.20]
  7    41 ms    40 ms    39 ms  lag-801.prr01mplsmn.netops.charter.com [96.34.3.65]
  8    40 ms    40 ms    38 ms  ae16.pr01.msp1.tfbnw.net [103.4.99.114]
  9    40 ms    40 ms    42 ms  po101.psw03.msp1.tfbnw.net [157.240.44.129]
 10    44 ms    46 ms    42 ms  173.252.67.115
 11    43 ms    43 ms    44 ms  edge-star-mini-shv-01-msp1.facebook.com [157.240.26.35]

Trace complete.

C:\Windows\system32>
```

Optical fiber amplifications, Virginia, England etc.
https://www.thefoa.org/tech/fiberamp.htm

https://en.wikipedia.org/wiki/Optical_amplifier

Oglesby, IL, US Starved Rock State Park

Starved Rock Lodge, located in Oglesby, IL, at the "crossroads of the Midwest" is just a few minutes from the intersection of Interstate 80 and 39. Depending on your arrival time, Whether it's a family getaway, corporate retreat, or dream wedding, Starved Rock Lodge is set in the middle of glacier-cut canyons, seasonal waterfalls and amazing bluff views. The Lodge was masterfully built by the Civilian Conservation Corps in the 1930's.

The park derives its name from a Native American legend. In the 1760s, Chief Pontiac of the Ottawa tribe, was attending a tribal council meeting. At this council of the Illinois and the Pottawatomie, an Illinois-Peoria brave stabbed Chief Pontiac. Vengeance arose in Pontiac's followers. A great battle started. The Illinois, fearing death, took refuge on the great rock. After many days, the remaining Illinois died of starvation giving this historic park its name – Starved Rock.

Relax and enjoy one of our various trolley tours! Trolley transportation is included with every tour. It's the perfect way to learn about the rich history of the Starved Rock area

This will include a 90 minute trolley tour with stops at the Starved Rock State Park Visitors Center, the IL Waterway Visitor Center and through downtown Utica.

Experience the fun outdoor adventure at Starved Rock State Park with a guided walk to three spectacular waterfalls and canyons. See spring come to life in French, St. Louis and Ottawa Canyons. This tour includes a hot lunch (special menu) in our restaurant and a relaxing trolley ride.

Be mesmerized by the beautiful bald eagles at Starved Rock. Ride our trolley to the Illinois Waterway Visitor Center for eagle viewing and an educational program.

Adair, IA, US Monument to the First Train Robbery in the West

Meet Dozrguy here Stay in state park cabins, ride trolly through park while rv is fitted

We took the exit for County Road G30 from I-80, to a point about a 1/2 mile South of I-80. There we traveled along a quieter, more historic stretch of road, a part of Old US Highway 6, was once the sight of a type of heist heretofore unheard of in the American West.

Telling the story of this history-altering event is a modest marker just over a mile west of Adair, Iowa, located off County Road G30. Here, an upright train car wheel marks the spot where, on the dusky summer evening of July 21, 1873, Jesse James and his gang executed the world's first robbery from aboard a moving train.

Led to believe $75,000 of gold was aboard a certain set of cars running this stretch of rails belonging to the Chicago, Rock Island & Pacific Railroad, the James gang devised a plan to stop the train by dismantling its track. Much to the dismay of the James gang, a delayed shipment of gold meant a paltry $2,000 was found in the train's safe. In order to compensate for this unexpected loss, the gang made off with an additional $1,000 worth of personal property from the train's passengers.

The wheel commemorating this fateful turning point in American thievery was donated by the Rock Island Railroad in 1954. Standing nearly as tall as an adult man, the monument illustrates the dangers faced when robbing a train in motion, throwing into heightened relief the boldness of the feat pulled off by Jesse James and his gang.

Kearney, NE Classic Car Collection

This collection of over 130 cars represents one man's 41-year love affair with the automobile. It also represents America's love affair and fascination with automobiles and the evolution of our society around the world of wheels. You'll see a variety of body types and styles. You'll enjoy the incredible detail crafted into many of these vehicles - artistic hood ornaments, instrument gauge panels, wheel styles and headlights.

World's Largest Time Capsule Seward, NE

Just outside of Lincoln, on an unassuming road, in the Southeast part of Nebraska, you'll find a big pyramid-shaped object next to a sideways zigzag protruding from the ground. This is the world's largest time capsule. And you won't believe what's inside!

The late Harold Keith Davisson (1907-1999), a local writer, store owner, and historian, built the time capsule in 1975. It was sealed and dedicated on July 4, 1975 and is set to be opened 50 years later on July 4, 2025.

The capsule weighs in at 45-tons and the concrete structure measures 20 x 8 x 6-feet. In 1977, the Guinness Book of World Records certified the time capsule as the largest in the world.

So what is inside the world's largest time capsule? It's said that over 5,000 items are buried within, including a Kawasaki motorcycle, a leisure suit, bikini bottoms, letters from local parents, soda bottles, tapes, records, bowling pins, fireworks, and a scholarship fund.

Omaha is the next big city you'll pass through while on I-80. Explore the Heartland Park of America or the Lewis and Clark Landing, check out the Durham Museum, housed in a 1931 train station, or visit the renowned Henry Doorly Zoo. And, while you're in cattle country, be sure to grab a steak. The Drover Restaurant and Lounge has been an Omaha institution for over 30 years.

Bear River State Park is a public recreation area straddling the Bear River on the east side of the city of Evanston, Wyoming. The 324acre state park was established in 1991 and is managed by Wyoming Division of State Parks and Historic Sites.

Fort Bridger, WY Fort Bridger Historical Association

Noted frontiersman Jim Bridger and his partner, Louis Vasquez, established Fort Bridger in 1843 to service emigrant traffic. For the next century, the area—known as the Bridger Valley—served as a crossroads for the Oregon/California Trail, the Mormon Trail, the Pony Express Route, the Transcontinental Railroad and the Lincoln Highway. Today, the valley in southwestern Wyoming is a historic byway, incorporating the small towns of Fort Bridger, Urie, Mountain View and Lyman, which were bypassed when Interstate 80 was built.

Reno Arch

The iconic Reno Arch is a retro neon sign that proclaims Reno as 'The Biggest Little City in the World" that flashes in all its silver and blue glory. It was built to promote and coincided with the completion of the Victory and Lincoln Highways (which, in Nevada now follow the paths of I-80 and US-50, respectively) in 1926-27. Reno held a legendary party where, according to eyewitness accounts, all the free food and whiskey one could drink was offered to locals, visitors, and dignitaries alike over the course of three days.

The National Automobile Museum Reno, NV

The mission is to collect and preserve the automobile for future generations, with an emphasis on vehicles collected by William Fisk "Bill" Harrah, to tell the story of the impact of the automobile on American society, and to perpetuate the legacy of Mr. Harrah as a renowned collector.

Fleischmann Planetarium and Science Center Reno, NV

Fleischmann Planetarium is part of the University of Nevada, Reno and it offers public star shows and large-format films showing daily in a dome theater, and public star observing courtesy of the Astronomical Society of Nevada. Built in 1964 and originally called the "Fleischmann Atmospherium-Planetarium," it was the first planetarium in the world to project full-dome movies (of time-lapse clouds and weather phenomena).

Wingfield Park Reno, NV

Wingfield Park is comprised of five parks: Wingfield Park (East Island), BReporter Park, Bennett Park, Wingfield Park (West Island) and Bicentennial Park. Within these

parks you can find picnic shelters, barbeque, basketball courts, an amphitheater, pathways and the Truckee River Whitewater Park. It's a great place to relax if you're in the downtown area.

Thunder Mountain Monument, an outsider art installation. Built by a WWII veteran and self-identified Creek Indian, the structure was meant to serve as a spiritual haven for the hippies of the era.

Thunder Mountain Monument Imlay Nevada. This unusual attraction is located along Interstate 80, about 130 miles east of Reno, Nevada. Thunder Mountain is One man's creation dedicated to the North American Indians.

Imlay, Nevada, is a tiny railroad town about a two-hour drive from Reno, Nevada. This desert town offers two fascinating attractions, Thunder Mountain Monument and a wonderful wildlife sanctuary, Safe Heaven Rescue.

Western Folklife Center Elko, NV

The Western Folklife Center is a nonprofit cultural center in Elko, Nevada that hosts exhibits, theater, music, and poetry events that celebrate the history and landscape of the American West

DNS server computers at the Santa Clara, California, data center

a.ns.facebook.com [129.134.30.12] And the following route to it:
po131.asw03.ord3.tfbnw.net [157.240.33.168]
po734.psw02.ord5.tfbnw.net [147.75.208.199]
173.252.67.73

b.ns.facebook.com [129.134.31.12] And the following route to it:
ae16.pr01.msp1.tfbnw.net [103.4.99.114]
po101.psw02.msp1.tfbnw.net [157.240.44.51]
173.252.67.59
b.ns.facebook.com [129.134.31.12]

c.ns.facebook.com [185.89.218.12] And the following route to it:
ae25.pr05.iad3.tfbnw.net [157.240.75.212]
po205.asw03.iad3.tfbnw.net [129.134.99.226]
po267.psw03.iad3.tfbnw.net [129.134.71.55]
157.240.36.69

d.ns.facebook.com [185.89.219.12] And the following route to it:
ae21.pr06.ord3.tfbnw.net [103.4.99.136]
po141.asw04.ord3.tfbnw.net [157.240.33.178]
po745.psw03.ord5.tfbnw.net [147.75.208.159]
157.240.36.63

We also learned that a growing percentage of Facebook Internet traffic is being handled through the newish IPv6 protocol.

What are the advantages of IPv6?

It solves the address congestion problem by providing enough addresses for any conceivable set of networked devices.

It removes IP header complexity (fixed length header, no packet fragmentation) which eventually will make packet forwarding faster (since we have all this mess with IP tunneling this advantage will only play out after the transition period).

Better support for IPSec

Better addressing schemes for multi-server application convolutions, such as Facebook or google.

IPv6 uses hexadecimal (including characters from 0 to 9 and letters A to F) thereby expanding address space from 32bit to 128bit.

IPv6 addresses aren't really supposed to spell out domain names, but Facebook has adopted an IPv6 addy that includes the characters "faceb00c."

A quick DNS lookup of facebook.com confirms this: the domain resolves to 2a03:2880:2130:cf05:face:b00c::1. Faceb00c. Get it?

```
facebook.com has address 173.252.120.6
facebook.com has IPv6 address 2a03:2880:2130:cf05:face:b00c::1
facebook.com mail is handled by 10 msgin.vvv.facebook.com.
```

For those less familiar with IPv6 and wondering how they did this: the interface identifier is the second half of a 128-bit IPv6 address and can be freely chosen by the host. In IPv4, there aren't that many bits to play with (a popular example is Google's 8.8.8.8 DNS server, which is in a 8.0.0.0/8 network), but IPv6 gives you 64 bits to freely choose.

Facebook owns the 2a03:2880::/32 range, further subdivided this range into subnets such as 2a03:2880:2130:cf05::/64 and then went with face:b00c:0:1 as interface identifier for the main web entry point in this subnet.

Wasn't a point of IPv6 to stop companies owning such a comparatively large segment of the address space? Why on earth do Facebook own an entire 96-bit block?

Also facebook has a very interesting tor address:
https://facebookcorewwwi.onion/,

https://engineering.fb.com/2017/01/17/production-engineering/legacy-support-on-ipv6-only-infra/

https://www.Internetsociety.org/resources/deploy360/2014/case-study-facebook-moving-to-an-ipv6-only-internal-network/

https://www.lightreading.com/ethernet-ip/ip-protocols-software/facebook-ipv6-is-a-real-world-big-deal/a/d-id/718395

https://www.networkworld.com/article/3254575/what-is-ipv6-and-why-aren-t-we-there-yet.html

250,000 plus servers including the underwater datacenters

Chapter One, Satellites-a Primer

A satellite or artificial satellite is an object intentionally placed into orbit in outer space. Satellites have a variety of uses, including communication relay, weather forecasting, navigation (GPS), broadcasting, scientific research, and Earth observation. Additional military uses are reconnaissance, early warning, signals intelligence and, potentially, weapon delivery. Other satellites include the final rocket stages that placed satellites in orbit and formerly useful satellites that are now defunct. https://en.wikipedia.org/wiki/Satellite

Communications satellite

Artificial satellite that relays radio signals

A communications satellite is an artificial satellite that relays and amplifies radio telecommunication signals via a transponder; it creates a communication channel between a source transmitter and a receiver at different locations on Earth. Communications satellites are used for television, telephone, radio, Internet, and military applications. Many communications satellites are in geostationary orbit 22,300 miles (35,900 km) above the equator, so that the satellite appears stationary at the same point in the sky; therefore the satellite dish antennas of ground stations can be aimed permanently at that spot and do not have to move to track the satellite. Others form satellite constellations in low Earth orbit, where antennas on the ground have to follow the position of the satellites and switch between satellites frequently.

Except for passive satellites, most satellites have an electricity generation system for equipment on board, such as solar panels or radioisotope thermoelectric generators (RTGs). Most satellites also have a method of communication to ground stations, called transponders. Many satellites use a standardized bus to save cost and work, the most popular of which is small CubeSats. Similar satellites can work together as a group, forming constellations. Because of the high launch cost to space, satellites are designed to be as lightweight and robust as possible. Most communication satellites are radio relay stations in orbit and carry dozens of transponders, each with a bandwidth of tens of megahertz.

Satellites are placed from the surface to orbit by launch vehicles, high enough to avoid orbital decay by the atmosphere. Satellites can then change or maintain the orbit by propulsion, usually by chemical or ion thrusters. In 2018, about 90% of satellites orbiting Earth are in low Earth orbit or geostationary orbit; geostationary means the satellites stay still at the sky. Some imaging satellites chose a Sun-synchronous orbit because they can scan the entire globe with similar lighting. As the number of satellites and space debris around Earth increases, the collision threat is becoming more severe. A small number of satellites orbit other bodies (such as the Moon, Mars, and the Sun) or many bodies at once (two for a halo orbit, three for a Lissajous orbit).

Earth observation satellites gather information for reconnaissance, mapping, monitoring the weather, ocean, forest, etc. Space telescopes take advantage of outer space's near perfect vacuum to observe objects with the entire electromagnetic spectrum. Because satellites can see a large portion of the Earth at once, communications satellites can relay information to remote places. The signal delay from satellites and their orbit's predictability are used in satellite navigation systems, such as GPS. Space probes are satellites designed for robotic space exploration outside of Earth, and space stations are in essence crewed satellites.

The first artificial satellite to be launched into the Earth's orbit was the Soviet Union's Sputnik 1, on 4 October 1957.

History

See also: Timeline of first artificial satellites by country

Early proposals

The first published mathematical study of the possibility of an artificial satellite was Newton's cannonball, a thought experiment by Isaac Newton to explain the motion of natural satellites, in his *Philosophiæ Naturalis Principia Mathematica* (1687). The first fictional depiction of a satellite being launched into orbit was a short story by Edward Everett Hale, "The BReporter Moon" (1869).[1][2] The idea surfaced again in Jules Verne's *The Begum's Fortune* (1879).

In 1903, Konstantin Tsiolkovsky (1857–1935) published *Exploring Space Using Jet Propulsion Devices*, which is the first academic treatise on the use of rocketry to launch spacecraft. He calculated the orbital speed required for a minimal orbit, and that a multi-stage rocket fueled by liquid propellants could achieve this.

Herman Potočnik explored the idea of using orbiting spacecraft for detailed peaceful and military observation of the ground in his 1928 book, *The Problem of Space Travel*. He described how the special conditions of space could be useful for scientific experiments. The book described geostationary satellites (first put forward by Konstantin Tsiolkovsky) and discussed communication between them and the ground using radio, but fell short of the idea of using satellites for mass broadcasting and as telecommunications relays.[3]

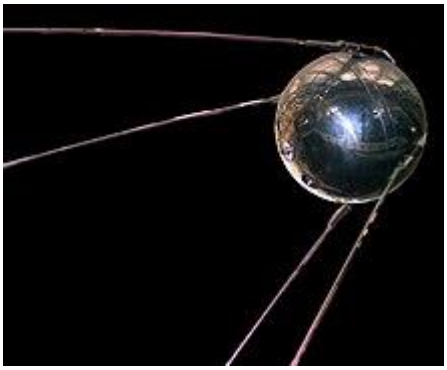
In a 1945 *Wireless World* article, the English science fiction writer Arthur C. Clarke described in detail the possible use of communications satellites for mass communications. He suggested that three geostationary satellites would provide coverage over the entire planet.[4]:1–2

In May 1946, the United States Air Force's Project RAND released the Preliminary Design of an Experimental World-Circling Spaceship, which stated "A satellite vehicle with appropriate instrumentation can be expected to be one of the most potent scientific tools of the Twentieth Century."[5] The United States had been considering launching orbital satellites since 1945 under the Bureau of Aeronautics of the United States Navy. Project RAND eventually released the report, but considered the satellite to be a tool for science, politics, and propaganda, rather than a potential military weapon.[6]

In 1946, American theoretical astrophysicist Lyman Spitzer proposed an orbiting space telescope.[7]

In February 1954, Project RAND released "Scientific Uses for a Satellite Vehicle", by R. R. Carhart.[8] This expanded on potential scientific uses for satellite vehicles and was followed in June 1955 with "The Scientific Use of an Artificial Satellite", by H. K. Kallmann and W. W. Kellogg.[9]

First satellites



Replica of the Sputnik 1

In the context of activities planned for the International Geophysical Year (1957–1958), the White House announced on 29 July 1955 that the U.S. intended to launch satellites by the spring of 1958. This became known as Project Vanguard. On 31 July, the Soviet Union announced its intention to launch a satellite by the fall of 1957.

The first artificial satellite was Sputnik 1, launched by the Soviet Union on 4 October 1957 under the Sputnik program, with Sergei Korolev as chief designer. Sputnik 1 helped to identify the density of high atmospheric layers through measurement of its orbital change and provided data on radio-signal distribution in the ionosphere. The unanticipated announcement of Sputnik 1's success precipitated the Sputnik crisis in the United States and ignited the so-called Space Race within the Cold War.

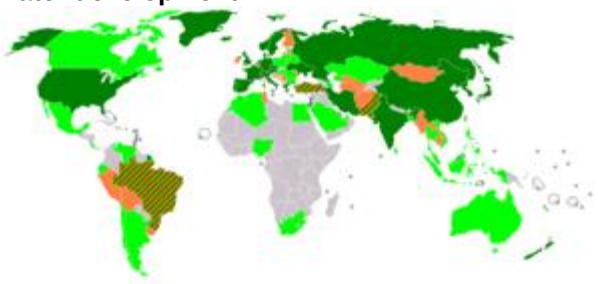
Sputnik 2 was launched on 3 November 1957 and carried the first living passenger into orbit, a dog named Laika.[10]

In early 1955, after pressure by the American Rocket Society, the National Science Foundation, and the International Geophysical Year, the Army and Navy were working on Project Orbiter with two competing programs. The army used the Jupiter C rocket, while the civilian–Navy program used the Vanguard rocket to launch a satellite. Explorer 1 became the United States' first artificial satellite, on 31 January 1958.[11] The information sent back from its radiation detector led to the discovery of the Earth's Van Allen radiation belts.[12] The TIROS-1 spacecraft, launched on April 1, 1960, as part of NASA's Television Infrared Observation Satellite (TIROS) program, sent back the first television footage of weather patterns to be taken from space.[13]

In June 1961, three and a half years after the launch of Sputnik 1, the United States Space Surveillance Network cataloged 115 Earth-orbiting satellites.[14]

Early satellites were built to unique designs. With advancements in technology, multiple satellites began to be built on single model platforms called satellite buses. The first standardized satellite bus design was the HS-333 geosynchronous (GEO) communication satellite launched in 1972. Begun in 1997, FreeFlyer is a commercial off-the-shelf software application for satellite mission analysis, design, and operations.

Later development



orbital launch and satellite operation
satellite operation, launched by foreign supplier
satellite in development
orbital launch project at advanced stage or indigenous ballistic missiles deployed

While Canada was the third country to build a satellite which was launched into space,[15] it was launched aboard an American rocket from an American spaceport. The same goes for Australia, who launched first satellite involved a donated U.S. Redstone rocket and American support staff as well as a joint launch facility with the United Kingdom.[16] The first Italian satellite San Marco 1 launched on 15 December 1964 on a U.S. Scout rocket from Wallops Island (Virginia, United States) with an Italian launch team trained by NASA.[17] By similar occasions, almost all further first national satellites was launched by foreign rockets.

After the late 2010s, and especially after the advent and operational fielding of large satellite Internet constellations—where on-orbit active satellites more than doubled over a period of five years—the companies building the constellations began to propose regular planned deorbiting of the older satellites that reach end of life, as a part of the regulatory process of obtaining a launch license.[*citation needed*] The largest artificial satellite ever is the International Space Station.[18]

By the early 2000s, and particularly after the advent of CubeSats and increased

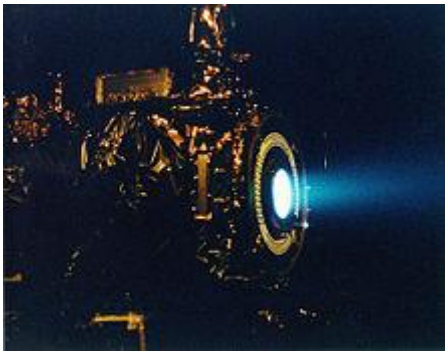
launches of microsats—frequently launched to the lower altitudes of low Earth orbit (LEO)—satellites began to more frequently be designed to demise, or breakup and burnup entirely in the atmosphere.[19] For example, SpaceX Starlink satellites, the first large satellite Internet constellation to exceed 1000 active satellites on orbit in ~2020, are designed to be 100% demisable and burn up completely on atmospheric reentry at end of life, or in the event of an early satellite failure.[20]

Components

Orbit and altitude control

Further information: Spacecraft propulsion

"Altitude control" redirects here. Not to be confused with Attitude control.



Firing of *Deep Space 1*'s ion thruster

Most satellites use chemical or ion propulsion to adjust or maintain their orbit,[4]:78 coupled with reaction wheels to control its three axis of rotation or attitude. Satellites close to Earth are affected the most by variations in the Earth's magnetic, gravitational field and the Sun's radiation pressure; satellites that are further away are affected more by other bodies' gravitational field by the Moon and the Sun. Without orbit and orientation control, satellites in orbit will not be able to communicate with ground stations on Earth.[4]:75–76

Chemical thrusters on satellites usually use monopropellant (one-part) or bipropellant (two-parts) that are hypergolic. Hypergolic means able to combust spontaneously in contact to each other or to a catalyst. The most commonly used propellant mixtures on satellites are hydrazine-based monopropellant or monomethylhydrazine–dinitrogen tetroxide bipropellant. Ion thrusters on satellites usually are Hall-effect thrusters, which generate thrust by accelerating positive ions through a negatively-charged grid. Ion propulsion is more efficient propellant-wise than chemical propulsion but its thrust is very small (around 0.5 N or 0.1 lb_f), thus requires a longer burn time. The thrusters usually use xenon because it is inert, can be easily ionized, has a high atomic mass and storable as a high-pressure liquid.[4]:78–79

Power

Main articles: Batteries in space, Nuclear power in space, and Solar panels on spacecraft

The International Space Station's black solar panels on the left and white radiators on the right

Most satellites use solar panels to generate power, and a few in deep space with limited sunlight use radioisotope thermoelectric generators. Slip rings attach solar panels to the satellite; the slip rings can rotate to be perpendicular with the sunlight and generate the most power. All satellites with a solar panel must also have batteries, because sunlight is blocked inside the launch vehicle and at night. The most common types of batteries for satellites are lithium-ion, and in the past nickel–hydrogen.[4]:88–89

Communications

Main article: Transponder (satellite communications)

Applications

Earth observation

Main article: Earth observation satellite

Deployment of the Earth Radiation Budget Satellite on STS-41-G, collecting data on Earth's weather and climate

Earth observation satellites is designed to monitor and survey the Earth, called remote sensing. Most Earth observation satellites are placed in low Earth orbit for a high data resolution, though some are placed in a geostationary orbit for an uninterrupted coverage. Some satellites are placed in a Sun-synchronous orbit to have consistent lighting and obtain a total view of the Earth. Depending on the satellites' functions, they might have a normal camera, radar, lidar, photometer, or atmospheric instruments. Earth observation satellite's data is most used in archaeology, cartography, environmental monitoring, meteorology, and reconnaissance applications.[*citation needed*] As of 2021, there are over 950 Earth observation satellites, with the largest number of satellites operated Planet Labs.[21]

Weather satellites monitor clouds, city lights, fires, effects of pollution, auroras, sand and dust storms, snow cover, ice mapping, boundaries of ocean currents, energy flows, etc. Environmental monitoring satellites can detect changes in the Earth's vegetation, atmospheric trace gas content, sea state, ocean color, and ice fields. By monitoring vegetation changes over time, droughts can be monitored by comparing the current vegetation state to its long term average.[22] Anthropogenic emissions can be monitored by evaluating data of tropospheric NO_2 and SO_2.[*citation needed*]

Communication

Main article: Communications satellite

A communications satellite is an artificial satellite that relays and amplifies radio telecommunication signals via a transponder; it creates a communication channel between a source transmitter and a receiver at different locations on Earth. Communications satellites are used for television, telephone, radio, Internet, and military applications.[23] Many communications satellites are in geostationary orbit 22,300 miles (35,900 km) above the equator, so that the satellite appears stationary at the same point in the sky; therefore the satellite dish antennas of ground stations can be aimed permanently at that spot and do not have to move to track the satellite. Others form satellite constellations in low Earth

orbit, where antennas on the ground have to follow the position of the satellites and switch between satellites frequently.

The high frequency radio waves used for telecommunications links travel by line of sight and so are obstructed by the curve of the Earth. The purpose of communications satellites is to relay the signal around the curve of the Earth allowing communication between widely separated geographical points.[24] Communications satellites use a wide range of radio and microwave frequencies. To avoid signal interference, international organizations have regulations for which frequency ranges or "bands" certain organizations are allowed to use. This allocation of bands minimizes the risk of signal interference.[25]

Navigation

Main article: Satellite navigation

Navigational satellites are satellites that use radio time signals transmitted to enable mobile receivers on the ground to determine their exact location. The relatively clear line of sight between the satellites and receivers on the ground, combined with ever-improving electronics, allows satellite navigation systems to measure location to accuracies on the order of a few meters in real time

Telescope

Main article: Space telescope

Astronomical satellites are satellites used for observation of distant planets, galaxies, and other outer space objects.

The Hubble Space Telescope

Experimental

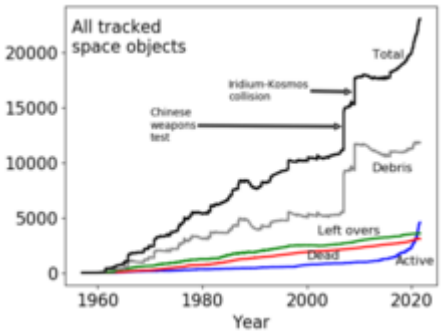
Tether satellites are satellites that are connected to another satellite by a thin cable called a tether. Recovery satellites are satellites that provide a recovery of reconnaissance, biological, space-production and other payloads from orbit to Earth. Biosatellites are satellites designed to carry living organisms, generally for scientific experimentation. Space-based solar power satellites are proposed satellites that would collect energy from sunlight and transmit it for use on Earth or other places.

Weapon

Main articles: Space weapon and Anti-satellite weapon

Since the mid-2000s, satellites have been hacked by militant organizations to broadcast propaganda and to pilfer classified information from military communication networks.[26][27] For testing purposes, satellites in low earth orbit have been destroyed by ballistic missiles launched from earth. Russia, United States, China and India have demonstrated the ability to eliminate satellites.[28] In 2007, the Chinese military shot down an aging weather satellite,[28] followed by the US Navy shooting down a defunct spy satellite in February 2008.[29] On 18 November 2015, after two failed attempts, Russia successfully carried out a flight test of an anti-satellite missile known as *Nudol*.[30] On 27 March 2019, India shot down a live test satellite at 300 km altitude in 3 minutes. India became the fourth country to have the capability to destroy live satellites.[31][32]

Pollution and interference



The growth of all tracked objects in space over time[33]

Issues like space debris, radio and light pollution are increasing in magnitude and at the same time lack progress in national or international regulation.[34][33] Space debris poses dangers to spacecraft[35][36] (including satellites)[36][37] in or crossing geocentric orbits and have the potential to drive a Kessler syndrome[38] which could potentially curtail humanity from conducting space endeavors in the future by making such nearly impossible.[39][40]

With the increase in numbers of satellite constellations, like SpaceX Starlink, the astronomical community, such as the IAU, report that orbital pollution is getting increased significantly.[41][42][43][44][45] A report from the SATCON1 workshop in 2020 concluded that the effects of large satellite constellations can severely affect some astronomical research efforts and lists six ways to mitigate harm to astronomy.[46][47] The IAU is establishing a center (CPS) to coordinate or aggregate measures to mitigate such detrimental effects.[48][49][50]

Some notable satellite failures that polluted and dispersed radioactive materials are Kosmos 954, Kosmos 1402 and the Transit 5-BN-3.

Generally liability has been covered by the Liability Convention. Using wood as an alternative material has been posited in order to reduce pollution and debris from satellites that reenter the atmosphere.[51]

Due to the low received signal strength of satellite transmissions, they are prone to jamming by land-based transmitters. Such jamming is limited to the geographical area within the transmitter's range. GPS satellites are potential targets for jamming,[52][53] but satellite phone and television signals have also been subjected to jamming.[54][55]

Also, it is very easy to transmit a carrier radio signal to a geostationary satellite and thus interfere with the legitimate uses of the satellite's transponder. It is common for Earth stations to transmit at the wrong time or on the wrong frequency in commercial satellite space, and dual-illuminate the transponder, rendering the frequency unusable. Satellite operators now have sophisticated monitoring that enables them to pinpoint the source of any carrier and manage the transponder space effectively.[*citation needed*]

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External links

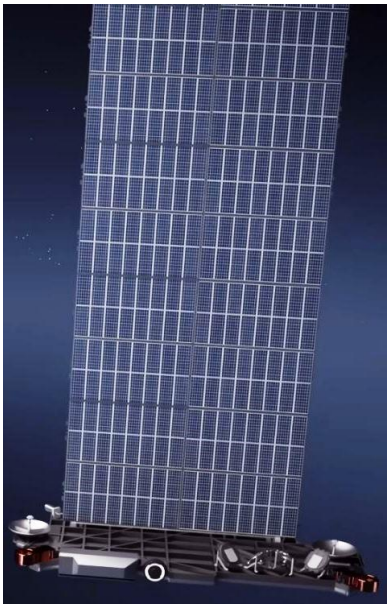
There are x satellites in orbit now, both military and commercial, American, Russian, Indian, Chinese, the EU, etc.

These satellites can be LEO, low earth orbit (approx. 350 miles), or GEO, geosynchronous high earth orbit (approx. 22,000 miles).

It could be years, hundreds or thousands of years, depending on height of orbit, but all of them will eventually come crashing down to earth.

https://www.nasa.gov/smallsat-institute/sst-soa/communications#9.6.1

Starlink



https://www.zdnet.com/article/spacex-unveils-starshield-starlink-service-for-national-security-usage/

10,000 satellites switching every four or so minutes as they pass by. Unlike TV satellites the Starlink satellite dish (nicknamed Dishy McFlatface by Elon Musk) has both send and receive capabilities.

Two antennas to communicate with Dishy McFlatface and two to communicate with earth stations (backhaul) Internet traffic.

The Hacking of Starlink Terminals Has Begun (wired.com) 48

Posted by BeauHD on Saturday August 13, 2022 @08:00AM from the like-any-emerging-technology dept.

AmiMoJo shares a report from Wired: *Since 2018, ELON Musk's Starlink has launched more than 3,000 small satellites into orbit. This satellite network beams Internet connections to hard-to-reach locations on Earth and has been a vital source of connectivity during Russia's war in Ukraine. Thousands more satellites are planned for launch as the industry booms. Now, like any emerging technology, those satellite components are being hacked. Today, Lennert Wouters, a security researcher at the Belgian university KU Leuven, will reveal one of the first security breakdowns of Starlink's user terminals, the satellite dishes (dubbed Dishy McFlatface) that are positioned on people's homes and buildings. At the Black Hat security conference in Las Vegas, Wouters will detail how a series of hardware vulnerabilities allow attackers to access the Starlink system and run custom code on the devices.*

To access the satellite dish's software, Wouters physically stripped down a dish he purchased and created a custom hacking tool that can be attached to the Starlink dish.

The hacking tool, a custom circuit board known as a modchip, uses off-the-shelf parts that cost around $25. Once attached to the Starlink dish, the homemade printed circuit board (PCB) is able to launch a fault injection attack -- temporarily shorting the system -- to help bypass Starlink's security protections. This 'glitch' allows Wouters to get into previously locked parts of the Starlink system. The researcher notified Starlink of the flaws last year and the company paid Wouters through its bug bounty scheme for identifying the vulnerabilities. Wouters says that while SpaceX has issued an update to make the attack harder (he changed the modchip in response), the underlying issue can't be fixed unless the company creates a new version of the main chip. All existing user terminals are vulnerable, Wouters says. Wouters is making his hacking tool open source on GitHub. Following his presentation, Starlink says it plans to release a "public update" to address the issue but additional details were not shared.

Russian Arms Manufacturer Developing Tech To Hunt Starlink Dishes (pcmag.com) 129

Posted by BeauHD on Wednesday December 21, 2022 @05:00AM from the search-and-destroy dept.

schwit1 shares a report from PC Magazine with the caption, "More Russian vaporware?" From the report: *A Russian arms manufacturer claims it can help the country's military detect and bombard Starlink satellite dishes, which have been crucial to the defense effort in Ukraine. Earlier this month, a mysterious company called Sestroretsk Arms Factory published a website that debuted the "Borshchevik" or "hogweed" system, which is designed to locate Starlink dishes at a distance of up to 10 kilometers (6.2 miles). The technology can supposedly pinpoint a Starlink dish within 5 to 60 meters (16 to 196 feet) of its actual location. In addition, it can be fitted on top of a moving vehicle, allowing it to detect Starlink activity across the front lines on a battlefield.*

However, it's unclear how the Borshchevik system actually works or if it's even effective. News of the technology was posted on a Telegram channel called "Reverse Side of the Medal," which seems to be closely associated with the Russian military, including the paramilitary Wagner Group. The user behind the Reverse Side of the Medal channel said they plan on testing the Borshchevik system on the frontlines in Russia's ongoing war with Ukraine.

SpaceX Unveils 'V2 Mini' Starlink Satellites With Quadruple the Capacity (arstechnica.com) 64

Posted by BeauHD on Tuesday February 28, 2023 @02:00AM from the new-and-improved dept.

An anonymous reader quotes a report from Ars Technica: *With Starlink speeds slowing due to a growing capacity crunch, SpaceX said a launch happening as soon as today will deploy the first "V2 Mini" satellites that provide four times more per-satellite capacity than earlier versions. Starlink's second-generation satellites include the V2 Minis and the larger V2. The larger V2s are designed for the SpaceX Starship, which isn't quite ready to launch yet, but the V2 Minis are slimmed-down versions that can be deployed from the Falcon 9 rocket. "The V2 Minis are smaller than the V2 satellites (hence the name) but don't let the name fool you," SpaceX said in a statement provided to Ars yesterday. "The V2 Minis include*

more advanced phased array antennas and the use of E-band for backhaul, which will enable Starlink to provide ~4x more capacity per satellite than earlier iterations."
SpaceX didn't specify the amount of data that each V2 Mini satellite can provide, but its first-generation satellites were designed for an aggregate downlink capacity of 17 to 23Gbps per satellite. The Federal Communications Commission recently gave SpaceX approval to launch 7,500 of the 30,000 planned second-generation satellites. A SpaceX Falcon 9 launch tentatively scheduled for today would put 21 V2 Minis into orbit. The larger V2 satellites that can't launch until Starship is ready will be able to send signals directly to cell phones, a capability that'll be used by SpaceX and T-Mobile in a partnership announced in August 2022. "Each Starlink V2 Mini satellite weighs about 1,760 pounds (800 kilograms) at launch, nearly three times heavier than the older Starlink satellites," notes Spaceflight Now. "They are also bigger in size, with a spacecraft body more than 13 feet (4.1 meters) wide, filling more of the Falcon 9 rocket's payload fairing during launch."
UPDATE: SpaceX successfully launched the first batch of "V2 Mini" Starlink satellites. "A Falcon 9 rocket hauled the 21 Starlink satellites into a 230-mile-high (370-kilometer) orbit after lifting off from pad 40 at Cape Canaveral Space Force Station at 6:13:50 p.m. EST (2313:50 GMT) Monday," reports Spaceflight Now. "SpaceX delayed the launch from earlier Monday afternoon to wait for radiation levels to abate following a solar storm that sparked dramatic auroral displays visible across Northern Europe and Canada." You can watch the launch here. Elon Musk also shared video of the first V2 satellites to reach orbit.

Starlink US residential customers are getting a limit on their high-speed Internet
Users may find themselves on the 'Basic Access' service if their usage exceed 1TB of data in a month.
https://www.zdnet.com/home-and-office/networking/starlink-us-residential-customers-are-getting-a-limit-on-their-high-speed-Internet/

Project Kuiper

Kuiper Systems LLC, commonly known as Project Kuiper, is a subsidiary of Amazon that was established in 2019 to deploy a large satellite internet constellation to provide low-latency broadband connectivity. Kuiper was a company codename for the project inspired by the Kuiper belt of distant objects orbiting the sun. On July 30, 2020, the Federal Communications Commission granted Amazon approval to deploy a constellation of 3,236 satellites into low Earth orbit.

Viasat

DIRECTV

Hughes

Satellite Internet services

	Max speeds	Regular monthly rate	Contract	Monthly equipment costs
HughesNet	25Mbps download, 3Mbps upload	$65-$175	2 years	$15 or $350 one-time purchase
Starlink	20-250Mbps download, 5-30Mbps upload	$110-$135	None	$599 one-time purchase (or $2,500 for Premium)
Viasat	12-150Mbps download, 3Mbps upload	$50-$200	2 years	$15 or $300 one-time purchase

https://www.zdnet.com/home-and-office/networking/best-satellite-Internet/

Amazon Reveals Its Project Kuiper Satellite Internet Dishes, Targets 2024 Launch (reuters.com) 30

Posted by BeauHD on Wednesday March 15, 2023 @03:00AM from the what-to-expect dept.

Amazon.com plans to launch its first Internet satellites to space in the first half of 2024 and offer initial commercial tests shortly after, the company said Tuesday, as it prepares to vie with Elon Musk's SpaceX and others to provide broadband Internet globally. Reuters reports: *Amazon's satellite Internet unit, Project Kuiper, will begin mass-producing the satellites later this year, the company said. Those will be the first of over 3,000 satellites the technology giant plans to launch in low-Earth orbit in the next few years. "We'll definitely be beta testing with commercial customers in 2024," Dave Limp, senior vice president of Amazon devices, said at a conference in Washington.*
The 2024 deployment target would keep Amazon on track to fulfill a regulatory mandate to launch half its entire Kuiper network of 3,236 satellites by 2026. Limp, who oversees Amazon's consumer devices powerhouse, said the company plans to make "three to five" satellites a day to reach that goal. With plans to pump more than $10 billion into the Kuiper network, Amazon sees its experience producing millions of devices from its consumer electronics powerhouse as an edge over rival SpaceX, the Musk-owned space company whose Starlink network already has roughly 4,000 satellites in space.
Amazon plans to launch a pair of prototype satellites early this year aboard a new rocket from the Boeing-Lockheed joint venture United Launch Alliance. The 2024 launch, carrying the initial production satellites, is expected to be the first of many more in a swift deployment campaign using rockets Amazon procured in 2021 and 2022. The company on Tuesday also revealed a slate of three different terminals, or antennas, that will connect customers with its Kuiper satellites in orbit. In a blog post on Tuesday, Amazon detailed its new terminals with photos and pricing.

Standard Customer Terminal: "Project Kuiper's standard customer terminal measures less than 11 inches square and 1 inch thick. It weighs less than five pounds without its mounting bracket. Despite this modest footprint, the device will be one of the most powerful commercially available customer terminals of its size, delivering speeds up to 400 megabits per second (Mbps). Amazon expects to produce these terminals for less than $400 each."

"Most Affordable" Terminal: "A 7-inch square design will be Project Kuiper's smallest and most affordable customer terminal. Weighing just 1 pound and offering speeds up to 100 Mbps, its portability and affordability will create opportunities to serve even more customers around the world. This design will connect residential customers who need an even lower-cost model, as well as government and enterprise customers pursuing applications like ground mobility and Internet of things (IoT)."

"Most Capable" Antenna Model: "**Project Kuiper's largest, most capable model is designed for enterprise, government, and telecommunications applications that require even more bandwidth. The device measures 19 inches by 30 inches, and will deliver speeds up to 1 gigabit per second (Gbps)."**

Delay/Disruption Tolerant Networking or DTN

Part one looks at delay-tolerant network architectures and platforms including DTN for satellite communications and deep-space communications, underwater networks, networks in developing countries, vehicular networks and emergency communications. Part two covers delay-tolerant network routing, including issues such as congestion control, naming, addressing and interoperability. Part three explores services and applications in delay-tolerant networks, such as web browsing, social networking and data streaming. Part four discusses enhancing the performance, reliability, privacy and security of delay-tolerant networks. Chapters cover resource sharing, simulation and modeling and testbeds.

- Reviews the different types of DTN and shows how they can be applied in satellite and deep-space communications, vehicular and underwater communications, and during large-scale disasters
- Considers the potential for rapid selection and dissemination of urgent messages is considered
- Reviews the breadth of areas in which DTN is already providing solutions and the prospects for its wider adoption

This cutting-edge resource provides a comprehensive treatment of applying delay-tolerant networking (DTN) principles to satellite-based network communications. Detailed models and analytical tools are used to evaluate performance and provide guidance in the field. This book presents the state-of-the-art in existing on-board and ground technologies that support satellite applications, such as communications protocols, algorithms, and security procedures. Readers gain key insight into the fundamental concepts of DTN applied to satellite networks (DTSNs) and case studies are provided. This book presents an authoritative introduction to the methods for computing metrics for satellite network modeling.

Satellite communications are examined, including satellite links, communication protocols, and distributed multiple access schemes, such as time division, code division, and frequency division. This book focuses on ways in which DTN might make terrestrial communication and observation via earth orbiting satellites less expensive and more robust. The fundamental concepts and analysis of the Ring Road Architecture are explored. Unique analyses on the motivating factors of using Inter-Satellite Links (ISL) to form networks in disruptive environments in space are discussed. This book explores the limits of larger and complex DTSNs as the number of satellites increase and different orbital formations become possible. As satellite networks become larger in upcoming years this book provides a guide for readers to stay informed about standard protocols such as DTN that will allow seamless interoperation, cost reduction, and risk mitigation.

Juan A. Fraire is a satellite constellation communication architect at Servicios Tecnologicos Integrados, Cordoba Argentina. He received his Ph.D. in engineering and applied sciences from Facultad de Ciencias Exactas, Fisicas y Naturales of the Universidad Nacional de Cordoba, Argentina. Jorge M. Finochietto is a professor in the school of engineering at the Universidad Nacional de Cordoba and an adjunct

researcher at Consejo Nacional de Investigaciones Cientificas y Tecnicas. He received his Ph.D. in electronics and communication engineering from Politecnico di Tornio Italy. Scott C. Burleigh is a principal engineer at NASA s Jet Propulsion Laboratory. He received his degree in English literature at the State University of New York, Albany.

Chapter Two, The Threats

Jamming and spoofing

> One common problem is attackers targeting the service rather than the satellites themselves. This year has seen jamming, GPS spoofing, and other cyberattacks launched against ViaSat and Starlink Internet services in Ukraine -- attacks that have coincided with Russia's invasion of the country. Western intelligence agencies attributed the attacks to Russia, and the country has been accused of using these techniques for a number of years.

"It's part of modern warfare, it's nothing new – we've seen GPS spoofing in Ukraine since 2014," says Juliana Suess, research analyst and policy lead on space security, as part of the military sciences team at security think-tank the Royal United Services Institute (RUSI). "Jamming and spoofing directly targets the links between satellites and ground stations," she explains.

By jamming Starlink connections, the flow of information is disrupted -- something that could be crucial in a conflict.

"Who would want to attack an Internet broadband service? As soon as Starlink becomes a tool in the hands of the Ukrainian army, it becomes a target," says Suess.

Anti-satellite weapons

Anti-satellite weapons (ASAT) might sound like something from a Bond movie, but they are real, if limited in scope. As a University of Oxford research paper on cybersecurity of satellites points out, "Space is difficult" – only nine countries (10 if you include the European Union) – have orbital space capabilities.

Even then, "a launch program alone does not guarantee the resources and precision required to operate a meaningful ASAT capability". But nations that do have ASAT capability are increasingly using these technologies to flex their muscles, even using live tests to destroy actual satellites.

China first destroyed one of its own satellites in 2007, attaching a kinetic energy weapon to a ballistic missile that targeted an ageing Fengyun-1C weather satellite. This led to concerns from other countries over both security and the prospect of space debris that could damage other satellites in orbit.

Also: NASA says space junk is one of the great challenges of our time. Here's why

More recently, Russia has also been criticised for using anti-satellite weaponry to destroy one of its own defunct satellites in November 2021. This test used an anti-ballistic missile interceptor as an ASAT weapon, destroying the low-orbit satellite and creating a vast amount of space debris, even forcing astronauts aboard the International Space Station to take shelter as a precaution.

The US condemned the test as "dangerous and irresponsible" and warned that the debris will remain in orbit for years, even decades.

While no military has launched a missile at the satellite of another country, the way a number of different countries have demonstrated its potential – including the US – means that such attacks against satellites can't be discounted in a future conflict.

While doubtless an effective strategy, using a missile to blow up a satellite is very much a blunt approach. But using electronic warfare and cyberattacks could provide an attacker with an option that could be just as debilitating.

Hacking satellites

The University of Oxford's research paper states that "as space systems become increasingly interconnected and computationally complex, new concerns about the threat of cyberattacks have been raised." It goes on to add that they could "pose a structural threat to the long-standing peace in orbit".

According to the US Department of Defense, one of those threats is the People's Republic of China. An in-depth research paper into China's military power suggests space is on the agenda, with "electronic warfare" a part of that approach, as Beijing looks to develop technology "that can contest or deny an adversary's access to and operations in the space domain during a crisis or conflict". However, what this technology might look like isn't specified.

A successful cyberattack against a satellite could have significant consequences. Blocking communications with the satellite, could shut off vital communications and services for millions of

people on the ground, for example. A cyberattack could even alter the course of a satellite in an attempt to disrupt or even permanently damage it.

"It does sound a bit 'Star Wars' to say, but if you were to take control over a satellite, you could make it do what you want it to – it obviously depends on the capability that satellite possesses," says Suess at RUSI.

"It could be something relatively simple, like completely shutting off communications links. Or you could expend limited fuel supplies, so a satellite becomes space debris. If you could make it tumble out of its orbit, you could make it collide with another satellite. Or you could destroy solar panels if you angle them correctly – the options are limitless," she explains.

Suess says many of these tactics would be complicated to pull off, especially due to the potential risk of inadvertently disrupting other targets.

"If the actor carrying out this attack is also a state actor, if you attack a satellite in a way where it collides with another satellite or becomes space debris, you could threaten your own space assets as well. Which is why I'd argue that the extreme end of the attack isn't feasible from a military perspective, if you're also using space," says Suess.

But while there could be rules and conventions that restrict governments from conducting full-scale cyberattacks against satellites run by other nations in space, the war in Ukraine shows that disrupting satellite communications is far from off the table.

Ageing technology

Satellites aren't built to last forever, but they can be in orbit for a decade or even longer, which means – along with the often lengthy timescales of satellite and space programs – that many satellites might be using ageing technology.

And once a satellite has been launched into space, it's difficult – even impossible – to upgrade the computer systems that power it. Think about how applying security updates to regular systems on Earth continues to be a major cybersecurity challenge, and then factor in the challenges of facing that issue if the systems are inaccessible.

That situation means that, if a cybersecurity vulnerability emerges, it could be there for the entire life of the satellite. And as space-connected technology becomes even more integrated into all our lives, that could be a problem if malicious cyber attackers find ways to disrupt or tamper with services.

It's a problem that NATO has warned could, if left unaddressed, have severe consequences for global security. "Cyberattacks have the potential to wreak havoc on strategic weapons systems and undermine deterrence by creating uncertainty and confusion," said 2019's Cybersecurity of NATO's Space-based Strategic Assets research paper.

It warned that the use of old IT equipment, the failure to update software with patches for removing known vulnerabilities, leaving potential weaknesses in supply chains and other factors are leaving satellite systems open to attack.

"I want to emphasize it's not really fair to say that it was their fault for not originally designing that into the security, because it wasn't a concern when that was originally designed," says Douglas McKee, principal engineer and director of vulnerability research for cybersecurity company Trellix's Advanced Research Centre.

Meanwhile as cyber criminals improve their capabilities, there's the potential they could look to the skies for new targets and opportunities.

Cyber criminals in space?

In what used to be an area that was the domain of governments, private companies are now making it easier to get into space. So at some point, could it become worthwhile for crooks to send up their own satellites?

"Would an attacker, if it allowed them to get a larger attack surface, pay half a million dollars to get either their hardware or themselves into space? It's a simple ROI calculation," suggests McKee. "If it cost me five hundred thousand dollars to do an attack but I get access to a new attack surface that's going to give me hundreds of millions of dollars – that cost benefit analysis is pretty reasonable," he says.

There's no illusion that securing satellites and other space technology isn't a challenging task, particularly when some of the software and hardware powering it could be obsolete even now. But like any other network, and even those that are unsupported, a good cybersecurity strategy is achievable if the basics are done correctly.

That means ensuring the computer systems and ground stations used to communicate with and control satellites, are secured.

"More broadly, think about constellations, not individual satellites. Most jammers will only work for a certain frequency, so if you have several satellites that all run with different frequency bands, that means if one of them is suddenly not working or compromised, you still have the others," says Suess.

"It's a similar thing for a cyberattack. If one of your ground terminals is compromised, but you have diverse networks of satellites and ground stations, that's less of a problem," she adds.

And as we look to the future, manufacturers of products ranging from cars to household appliances are learning that cybersecurity is something that needs to be part of the building process from the start, because that's the best way to ensure its resilience against cyberattacks.

While the prospect of cyberattacks against a satellite might appear to be unlikely in the very near future, anything that's built with IoT connectivity can be accessed via the Internet – and that could potentially include satellites. Having that in mind long before anything is launched into space is going to be key for the future.

"It just comes down to making sure that security architecture is baked in from day one. This is something we've learned in other areas of the computer industry and the security industry – and there's lots of processes and policies already that we can learn from," says McKee.

More On Cybersecurity

- The ESA wants you to hack its satellite for cybersecurity reasons
- How hackers could spy on satellite Internet traffic with just $300 of home TV equipment
- FBI and CISA warn over threats to satellite communications networks
- IoT devices can undermine your security. Here are four ways to boost your defences
- The scary future of the Internet: How the tech of tomorrow will pose even bigger cybersecurity threats

A note on Open Source Repositories and OpSec (GitHub, GitLab, etc.)

Consider that almost all "free" and "open source" software being developed in the world by many folks relies upon modules and packages published by other folks. Sometimes hundreds or thousands of those modules. It doesn't take a degree in rocket science to imagine that someone could have published something in one of those building blocks - even as source that has a back door or skims information.[10]

The process for getting including software additions and changes into online banks of open source software projects may surprise you. It usually goes something like this:

Someone makes a software change, potentially thousands of lines of code. They upload the changes and create a "pull request" that describes what they did, and it goes up for review and approval by the someone or someone's who have the privilege to include (merge) the submitted changes into the project. These "officials" of the project are generally no more than other software developers working after hours on the project out of the goodness of their hearts and who care, but who are almost certainly employed at a full-time job and can never spend enough time on the work. At best, they're often focused on doing their own things to some other parts of the open-source project. They are not all-knowing, and the time and effort spent on review is laughable.

Do you think they sweat over every line of code that's been submitted? No doubt some do, especially if the changes are small. But what if there's a big block of code that claims to do some specific complex task? That block of code may even come with its own set of unit and system tests to verify that it works. The person or persons reviewing the pull request will most likely:

You did leave out the part where the code author needs to provide justifications (rationale) for the code changes. It may layer onto what's released, for a variety of reasons - some performance, some reliability, some simply because the intent of the designer isn't precisely the same as another.

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[10] *The majority of programmers do copy code most of the time when developing their projects. This may be their own code that they previously produced, or code from public repositories, or open-source. https://technocript.com/do-developers-copy-code/*

a) Glance over the code changes looking for basic issues like misspelled variable names or compiler warnings. These changes are presented as a comparison, often quite cryptically, between "before" and "after" code modules that run on for pages upon pages. Their eyes will glaze over after page 2.

b) Run the tests supplied with the code.

c) Run the code as part of the system it's been developed to go into and see if it works there.

d) Write "LGTM" approving the request thinking, gee it's nice when people contribute.

e) Merge the changes into the project.

Boom, it's part of the project forever more. No vetting of the submitter (who may go by an alias like "hackzor" but definitely not "the Peoples Republic of China"), no detailed security review, no real understanding of how the code works.

It would not be hard *at all* for an adept programmer *with intent* to code a program that says it does one thing, looks convincingly like it does that thing, yet actually does quite another thing. Just think about how many bugs have already gotten into the software through that same process of review and approval.

The software world utterly revolves around using modules created by others. The scrutiny that goes into the choice to use a module is surprisingly, shockingly, laughably lacking. Trust me on this. It's so scary that I long ago started to fancy the thought that commercial software, even from a big company that's trying to squeeze you for all it can, may actually still be the best choice. Just try to pick the least evil company and hope for the best.

Eight Teams of Hackers Will Compete To Breach U.S. Satellite In Space (newsweek.com) 5

Posted by BeauHD on Saturday June 24, 2023 @03:00AM from the capture-the-flag dept.

In August, white-hat hackers at the DEFCON hacker convention will compete to try and breach the computer systems on a satellite in orbit. It took four years, but "this year, we are in space for real," said Steve Colenzo, Technology Transfer Lead for the Air Force Research Laboratory's Information Directorate in Rome, New York, and one of the contest organizers. From a report: *Hack-A-Sat 4, taking place live at DEFCON Aug. 10-13 in Las Vegas, will be the first-ever hacking contest staged on a vehicle in orbit. In previous years, the contests used genuine working satellite hardware, but running safely on the ground. [...] Hack-A-Sat 4 is an attack/defend contest in which teams compete to hack each other's systems while defending their own. It is being staged by the Air Force Research Laboratory and the U.S. Space Force. More than 380 teams signed up for the qualification round in April, and the eight top-scoring ones, which include contestants from Australia, Germany, Italy and Poland, as well as the U.S., will participate in the finals at DEFCON.*

"We always knew our objective was to do this in space," Colenzo said. But when, back in 2020, organizers asked satellite operators if they could stage a hacking contest on

their space assets, "The answer, and there was really no hesitation, the answer was always no." Hack-A-Sat organizers realized that, if they wanted to reach their objective of staging such a contest in space, they would have to launch their own satellite, Colenzo said. The Moonlighter satellite was launched on a SpaceX rideshare rocket to the International Space Station June 5 by the U.S. government-backed non-profit The Aerospace Corporation. It's a foot-long toaster-sized cubesat satellite with extendable solar panels.

If all goes according to plan, Moonlighter will be deployed into orbit early in July, Project leader Aaron Myrick told Newsweek. Moonlighter is designed to be hacked, he said, and there are numerous safety measures in place. "The first thing that we said was that propulsion was off the table," Moonlighter can't change its own orbit, which might make it a hazard to other satellites. And its ground controllers have the ability to reboot the system, kicking out any intruders and restoring their control.

Introduction

What has the space age ever done for me?' you might ask. But from telecommunications to GPS and providing accessible Internet connections for millions of people around the world, satellites and the space-based services that they provide are crucial to how we operate as a modern society.

Some of humanity's greatest innovations have emerged from space exploration. With a new space race led by the next generation of private companies, here's how they're pushing the boundaries again.

But just because they are in orbit, that doesn't mean satellites are out of reach of attack: security is an ongoing concern and one that is likely to grow.

QOS

Routing and Quality-of-Service in Broadband LEO Satellite Networks describes mechanisms for supporting Quality-of-Service (QoS) strategies that consider properties of low earth orbit satellite networks and their effects on link handover.

Ground Station Design and Analysis for LEO Satellites

Interference aspects, covering intermodulation interference modeling for LEO satellite ground stations and downlink adjacent interference for LEO search and rescue satellites

Sun synchronization, covering nodal regression and Sun synchronization of low Earth orbits through inclination angle.

Horizon plane and communication duration, covering communications duration with LEO satellites under ideal, practical and designed horizon plane for LEO satellite ground stations

Figure of merit and system noise temperature, covering composite and antenna noise temperature, Sun noise experiment and de-sensibilization measurements at LEO satellite ground stations

Interference aspects, covering intermodulation interference modeling for LEO satellite ground stations and downlink adjacent interference for LEO search and rescue satellites

Sun synchronization, covering nodal regression and Sun synchronization of low Earth orbits through inclination angle

QKD

Chapter Three, Going Out There

Lefty remained a bit restless in retirement. Podcasts kept him informed on current technology and social issues, streaming video kept him somewhat entertained but there is a limited amount of that available, and divided among services that hope to get you to pay for them all. Creatively however, one could play a rotating trial membership game to prevent the decimation of a fixed income.

He read a steady stream of eBooks of biographies of historical technology figures, and the excellent science fiction writing of Asimov and Clarke.

His latest interest was piqued by the hacking of Starlink satellites and the latest sci-fi writings of Daniel Suarez about remote asteroid mining.

He also played with https://chat.openai.com/chat and https://stablediffusionweb.com.

LE what does a sample data stream of satellite communications look like?

A sample data stream of satellite communications may include several different types of data, including video, audio, text, and sensor data. The data may be transmitted in real-time or may be stored and transmitted at a later time. The data may also be compressed or encrypted for security purposes. The format of the data stream may vary depending on the specific satellite communication system being used.

LE show a sample satellite data stream

I'm sorry, I am a text-based AI and I am not able to show you a sample satellite data stream. However, I can tell you that a sample satellite data stream may contain the following types of data:

- Video: High-definition video footage of a specific location or event.
- Audio: Voice communications between ground stations and satellites or between satellites.
- Text: Telemetry data, such as satellite position and status information.
- Sensor data: Data collected by various sensors on the satellite, such as temperature, humidity, and atmospheric pressure.

The data stream may also include additional information such as time stamps, identification codes, and error correction codes. The format of the data stream may be in the form of packetized data and may be transmitted using a protocol such as TCP/IP.

LE show me satellite telemetry data

I'm sorry, I am a text-based AI and I am not able to show you satellite telemetry data, however, I can describe the general format of satellite telemetry data.

Telemetry data is a type of data that is collected by sensors on a satellite, such as temperature, voltage, and current measurements. This data is used to monitor the health and status of the satellite, including its power systems, propulsion systems, and communications systems.

Telemetry data is typically transmitted in a structured format, such as comma-separated values (CSV) or Extensible Markup Language (XML). Here is an example of a satellite telemetry data packet in CSV format:

makefile Copy code

```
Time,Temperature,Voltage,Current
12:00:00,25.3,28.1,2.4
12:00:01,25.4,28.2,2.5
12:00:02,25.5,28.3,2.6
```

The first line of the CSV file contains the field names, and each subsequent line contains the corresponding data values. The data may contain several parameters and they may be encoded in a specific format, such as hexadecimal or binary.

LE show me sensor data

I'm sorry, I am a text-based AI and I am not able to show you sensor data, however, I can describe the general format of sensor data.

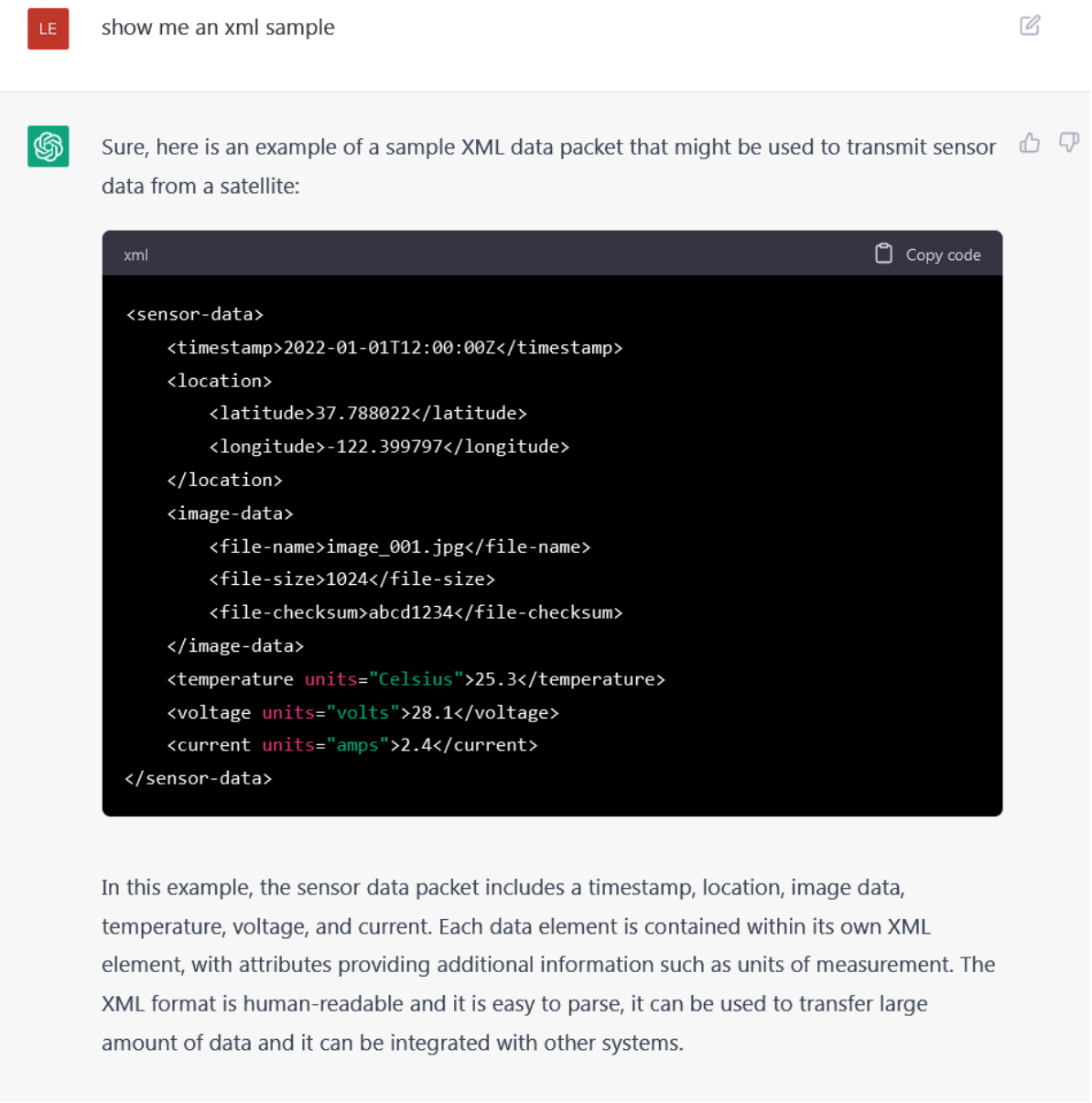
Sensor data refers to information collected by various sensors on a satellite, such as cameras, magnetometers, and accelerometers. The data collected by these sensors can be used for a variety of purposes, such as monitoring weather patterns, tracking the movement of wildlife, and mapping the Earth's surface.

Sensor data is typically transmitted in a structured format, such as comma-separated values (CSV) or Extensible Markup Language (XML). Here is an example of sensor data from a camera sensor in CSV format:

makefile Copy code

```
Time,Latitude,Longitude,Image
12:00:00,37.788022,-122.399797,image_001.jpg
12:00:01,37.788142,-122.399711,image_002.jpg
12:00:02,37.788262,-122.399624,image_003.jpg
```

The first line of the CSV file contains the field names, and each subsequent line contains the corresponding data values. The image data will be sent separately, in a binary format, often as JPEG, PNG, or other image file format. The sensor data may also be compressed to reduce the bandwidth needed for transmission.

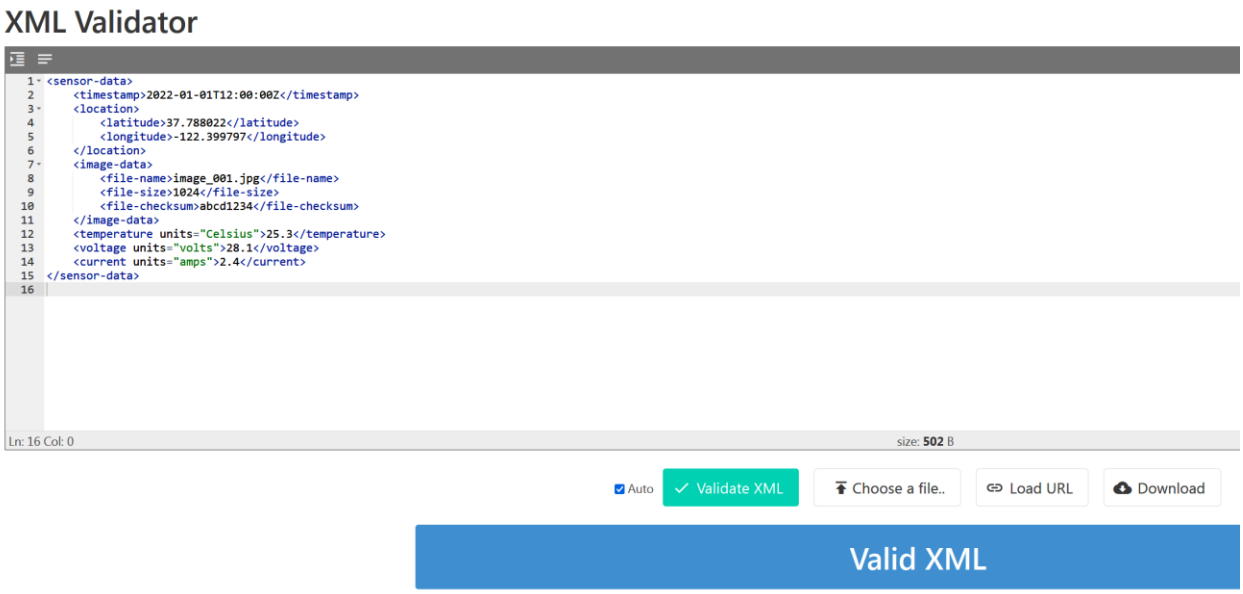


So despite the self-deprecation, this lowly text-based AI was able to show me some basic information about satellite data streams, whether it realized it or not. We are perhaps still far distant from the singularity[11].

So what is the xml[12] language all about he thought to himself.

[11] *a hypothesized future era or event when exponential improvements in computer intelligence and advances in technology will result in an acute change in human society and evolution. Dictionary.com*

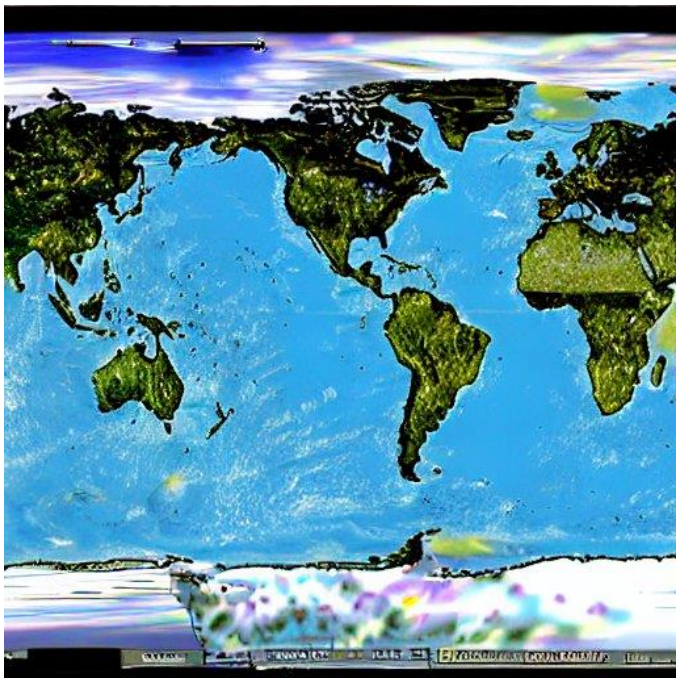
[12] *Extensible Markup Language (XML) is a markup language and file format for storing, transmitting, and reconstructing arbitrary data. It defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. Wikipedia*



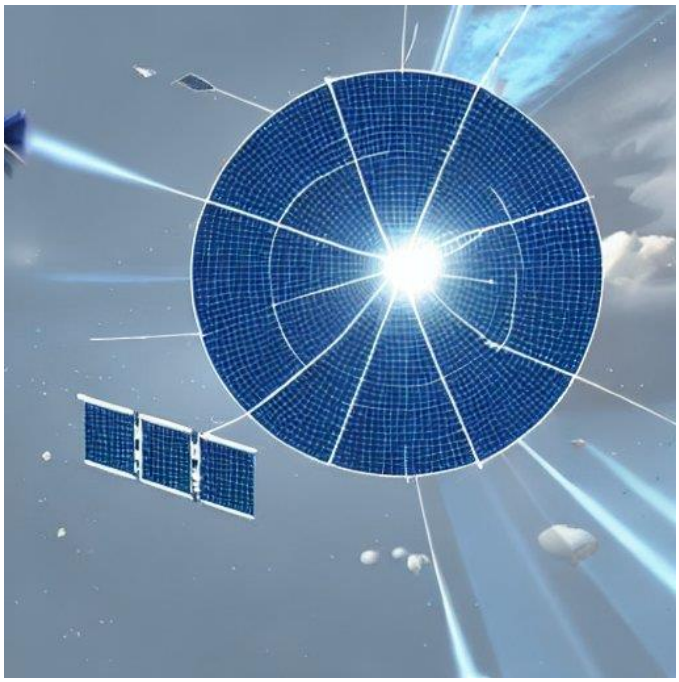
So https://codebeautify.org/xmlvalidator reports this as valid code.

Since the space born data center was Top Secret, we had the Stable Diffusion Online AI render an image of what is might look like.

A satellite data stream image also created by Stable Diffusion:



A satellite sending data.



<datapacket>Insider Story One</datapacket>

So forgetting the past and focusing on the future of what we now needed to do, Lefty decided to get the old band got back together one more time.

Our previous fearless leader, JNC, aka Cool Hand, had migrated from Florida to Minnesota to work for a corporation. So he agreed that he could only to help us remotely, especially since there would be no million dollar RV involved for this caper. He did send this panoramic photo from out of his front door by way of explanation.

With Facebook's $150 billion dollars per year in revenues now destroyed, they used their $200 billion dollars cash on hand to build a space station data center. The cost of which being comparable to the International Space Station or ISS, and additionally funded by investments from a dozen Silicon Valley companies with a combined $2 trillion of cash on hand. They expected to cover the $4 billion per years in operating costs with ad revenue, since server cooling in space was not a serious problem, although convection cooling does not work in a vacuum, so the data center cooling units recirculated to radiator fins on the station exterior. Electrical generation was done with solar panels and a small relatively low cost nuclear reactor.

And to make things worse they had just let a former orange colored President (The Mango Mussolini) back on their site to continue his spread of lies and grift.

https://www.datacenterknowledge.com/hardware/space-final-frontier-data-centers

Details were secret but we suspected that it looked something like the International Space Station or ISS.

https://www.avalanche-technology.com/data-centers-in-space-stage-3-the-ultimate-data-center-in-space/
https://www.google.com/search?client=firefox-b-1-d&q=data+center+in+space

Because the next phase of this plan required IRL experiences and the DarkWeb group strived for anonymity, they passed on this adventure but indicated that they might be up for the next one, should the opportunity present itself.

So Lefty had no choice but to consider recruiting the Insider Forum group, who he was sure would be up for another road trip.

So A. User aka Lefty decided he might want to get the *Merry Band of Misfits and Malcontents* back together, for this hack. They would need to write some malicious xml code. But first they would need to write xml validation and preview tools for the RealOS Internet Scout browser.

Amii
Colakid
Dozrguy
VJJ
JNC aka "Cool Hand"
BBBB
Hwrx
Mt
Michigan Mary
Nigthhawk, needed for the router work
Renee, needed for the OS work
Lefty Masters
Lefty Kerbin
Lefty –Aka Lefty21WTF, Drew1905, Drew1906, (srfreeman), RealOS, Johnny Dronehunter, Anonymous Insider, and Chuck Cutler.
The Guy Fawkes Mask Group
Hula_Baloo
CrazyKats
FredWilson_905, aka WilN937
Techie007L

Additional additions and modifications that will be made to the OS include the incorporation of:

- Quantum key distribution (QKD) as a secure communication using a cryptographic protocol which has the ability of two communicating users to detect the presence of any third party trying to gain knowledge of the key. We will create a PCI-e 5 add-in board, and write a hardware driver to handle this processing. This board will house an RTX4090 NVidia graphics processor or GPU without the excessive and overdesigned fans that currently keep the price of these units artificially excessive.
- A revised Host Intrusion Protection System or HIPS firewall with granular controls that prevents code entry via a command line. This will prevent Trojans using malware commands to turn off protections or allow communication to malicious command

and control server IP's. It will also have the ability to Sandbox[13] any software applications that you may choose.

- A built in Wireshark[14] like network traffic analyzer tool for automatic monitoring and alerting of any unusual DNS requests or outbound network traffic. The interface will use a skeuomorphic three dimensional model and, unlike current tools, be easy to use for average computer user. The installation and configuration will be done via a series of easy to understand software Wizards.

https://en.wikipedia.org/wiki/XML

Or could ChatGPT write the code for them?

As every programmer knows, most all code is copied and pasted from someone (somewhere) else anyway.

In a recent report, Israeli cybersecurity company Check Point warned that cybercriminals are already using ChatGPT to develop malicious programs on the Dark Web. According to Check Point, ChatGPT makes it possible for even unskilled threat actors to create functioning malware.

https://www.infoq.com/news/2023/01/chatgpt-creating-malware/

After attending the Hack a Satellite [Hack-A-Sat] Contest at DEF CON 29, the Insiders obtained some new ideas

[13] *In computer security, a sandbox is a security mechanism for separating running programs, usually in an effort to mitigate system failures and/or software vulnerabilities from spreading across the OS. Wikipedia*

[14] *Wireshark is a free and open-source packet analyzer software tool used for network troubleshooting and analysis. Wikipedia*

Using a high jacked master oscillator power amplifier or MOPA transmitter, they plan to introduce the malicious xml code into the data centers virtually unlimited and unregulated 100 Gb/s optical communications backhaul link[15]., via the optical laser antenna array on the space station data center using the NASA open source Delay/Disruption Tolerant Networking or DTN protocol.[16]

This transmitter uses a CW distributed feedback or DFB, laser with pulse carving modulators, to reduce transmission or TX losses, and a high efficiency wall plug power amplifier power amplifier.

The laser signal would travel at the speed of light in a vacuum[17] which is 3 * 10^8 or in real terms, 300,000,000 meters per second.

We were not much interested in pulse-carving on receiving or RX side, because we didn't plan to land the plane, so to speak.

However, we will use or Quantum key distribution or QKD[18] to encrypt the xml code signals sent to the datacenter AI computers.

Hacked LEO Starlink satellites as relays
Space station in geostationary orbit to reach whole planet

Coordinated Universal Time or UTC[19]

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[15] RF or radio frequency links are no longer used due to reduced diffraction (beam spreading), virtually unlimited available bandwidth maturity and high performance of free-space optical, or FSO, communications.

[16] Delay-tolerant networking (DTN) is an approach to computer network architecture that seeks to address the technical issues in networks that may lack continuous network connectivity. Examples of such networks are those operating in mobile or extreme terrestrial environments, or planned networks in space. Wikipedia

*[17] In mathematical notation, 10^8 represents ten raised to the power of eight, meaning ten multiplied by itself eight times. So, 10^8 = 10 * 10 * 10 * 10 * 10 * 10 * 10 * 10 = 100,000,000.*
*Therefore, 3 * 10^8 = 3 * 100,000,000 = 300,000,000.*

[18] Quantum key distribution (QKD) is a secure communication method that implements a cryptographic protocol involving components of quantum mechanics. An important and unique property of quantum key distribution is the ability of the two communicating users to detect the presence of any third party trying to gain knowledge of the key. Wikipedia

[19] Coordinated Universal Time or UTC is the primary time standard by which the world regulates clocks and time. It is effectively a successor to Greenwich Mean Time (GMT). Wikipedia

Florida Startup Moves Closer to Building Data Centers on the Moon (gizmodo.com) 81

Posted by BeauHD on Tuesday March 07, 2023 @02:00AM from the moon-tight-security dept.

Unprecedented access to space is leading to all sorts of cool new ideas, including the prospect of storing data on the lunar surface. Cloud computing startup Lonestar Data Holdings announced the results of its latest funding round, taking it one step closer to this very goal. Gizmodo reports: *The Florida-based company raised $5 million in seed funding to establish lunar data centers, Lonestar announced in a press release on Monday. Lonestar wants to build a series of data centers on the Moon and establish a viable platform for data storage and edge processing (i.e. the practice of processing data near the source, as a means to reduce latency and improve bandwidth) on the lunar surface. "Data is the greatest currency created by the human race," Chris Stott, founder of Lonestar, said in an April 2022 statement. "We are dependent upon it for nearly everything we do and it is too important to us as a species to store in Earth's ever more fragile biosphere. Earth's largest satellite, our Moon, represents the ideal place to safely store our future."*

In December 2021, Lonestar successfully ran a test of its data center on board the International Space Station. The company is now ready to launch a small data center box to the lunar surface later this year as part of Intuitive Machines' second lunar mission, IM-2 (the company's first mission, IM-1, is expected to launch in June). Intuitive Machines is receiving funding from NASA's Commercial Lunar Payload Services program for delivering research projects to the Moon as part of the space agency's Artemis program. The lunar data centers will initially be geared towards remote data storage and disaster recovery, allowing companies to back up their data and store it on the Moon. In addition, the data centers could assist with both commercial and private ventures to the lunar environment.

The miniature data center weighs about 2 pounds (1 kilogram) and has a capacity of 16 terabytes, Stott told SpaceNews. He said the first data center will draw power and communications from the lander, but the ones that will follow (pending its success) will be standalone data centers that the company hopes to deploy on the lunar surface by 2026. The test is only supposed to last for the duration of the IM-2 mission, which is expected to be around 11-14 days, an Intuitive Machines spokesperson told SpaceNews.

Epilogue

(Written in 2021)

So here we are now. Mother Nature has put us all in a killer virus timeout.

A timeout that gives us an opportunity to apply science towards a cure for a virus, which may or may not ever be achieved. But also importantly, she has given us time to think about how it is we arrived at this point.

For more than two hundred years, we have abused this planet and wasted her abundant air, water, animal, and plant life resources. We exterminated the indigenous populations who tried to teach us how to live in harmony with nature. We refused to be taught what they had learned over thousands of years, taking only what they needed and respecting the earth. Now Mother Earth is showing us that we are not the dominators of this planet. We will not kill this planet, it is us, our species, who will go extinct, and be killed by it.

Politicians say they want things to go back to normal. But for the majority of the eight billion people on this planet, normal really sucks. The majority of us humans want something better.

We want a political system that serves the will of the people, not the interests of the rich and powerful.

We want an economy that is not based on consumer spending and every increasing planet destroying consumption. We do not care about the necessary quarterly increases of profits of investors for parasitic entities like Wall Street.

We want a society where people care for and look after each other. We can and must cure extreme poverty, disease, and hunger across the entire globe.

We can end our endless wars if we end our desires for world colonialization.

Life, liberty and the pursuit of happiness are inalienable human rights our founders said. Not just for Americans, but for the entire world.

The majority of our politicians today have become a cult of domestic terrorists who suppress democracy, damage our environment, threaten our existence as a species, neuter our government agencies, incite our worse instincts, divide us, and inflame our reptilian brains with hatred for others. They actively work against our best interests on a daily basis. They do daily damage to our necessary institutions, diminish, and destroy our long evolved ethics, values, and morals. They are the rich and powerful and they think that this makes them inherently smart and always right. Yet, they have no moral boundaries, and are completely disconnected from any conscience they might have once had.

Those who do not believe and understand this are a part of this cult, which denies science and places little or no value on knowledge and wisdom. They instead have their magical beliefs, predjuces, bigotries, and theories. They have all joined a death cult, awaiting the end of days.

Our current rolling tragedy of 100k plus dead from this virus will cause unthinkable, unimaginable, and unpredictable future changes in our current political, social, and economic systems over the course of the next few years and for

the decades to come. To put it simply, everything and everyone will change or be changed by this.

We have neglected and abused our minority and impoverished populations. We have poisoned them with tainted water, polluted the air they breathe, offer them little or no health care. These are the very people who are and have been discriminated against in educational and employment opportunities and disadvantaged by our economic, political, social, and judicial systems. But right now, they are dying in record and disproportional numbers, because of their peasant status and injured health. Yet these are the very people we depend on to produce and deliver our food, operate our mass transportation systems, supply our water, and keep our lights on. (And our Netflix working)

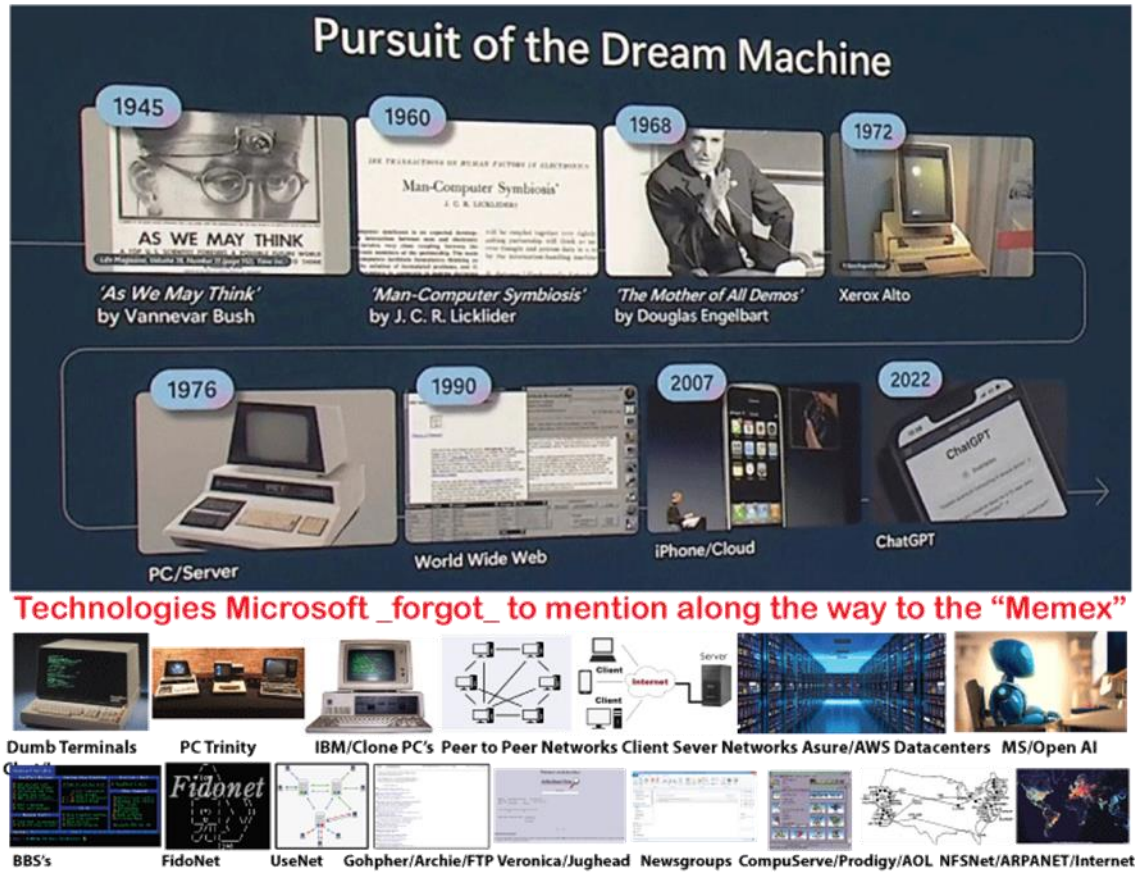
This pandemic will be an extinction event for many small businesses, especially minority and women owned businesses. It will turn small town main streets and rural downtowns into ghost towns. The corporations are gobbling up the small business relief money through the loopholes, and the big banks are collecting big fees on these loans, leaving the unbanked majority of actual small businesses out in the cold.

We can use this time to fix these systems, or not. We can use this time to become better humans, or not. We can use this time to help ensure our survival, or not.

I think that we can all do better.

All of our lives now most certainly depend on it.

In search of Human Augmentation via knowledge machines



Afterword

Or will willful ignorance continue to rule our species?

"History is obviously repeating itself, and although we have been writing it down for millennia, we never learn anything. Whenever we discover new lands or peoples, our greed and cultural arrogance mean it always ends in disaster. Imagine if we hadn't wiped out the indigenous people of North America—what we could have learned today from their very different cultures. The first white settlers were fed from their gifts of food, and in return they gradually butchered them and pushed the remaining survivors onto reservations. We still celebrate Thanksgiving in memory of those Native Americans that filled the newcomers' stomachs with turkey when they needed help. As a thank you, there was genocide because they stood in the way of expansion. It was the same in South America. Columbus brought high, diplomatic ideals with him, but also sickness and the greed for gold. Then came Hernando Cortes, who saw the gold and swiftly butchered the Aztecs, allowing him to take it all for the Spanish crown." So we can only hope that the aliens, if there are any, don't have anything we want. Even if they have nothing of interest to us, we will try to wipe them out. Just think about the indigenous Australians. They wandered the desert in loincloths, or even naked, surrounded by expanses of nothing. What happened to them? There are only very few left, and they are forcefully integrated or forced onto reservations where they drink themselves to death because of the lack of opportunity forced on them. "The Cambodian dictator, Pol Pot, had everyone who wore glasses killed in the name of Communism, because he thought they belonged to the middle class. Later, in the famous killing fields, children were killed against trees and their parents beaten to death with clubs and iron bars, to save ammunition. There were more people to be killed than they could cope with, so waiting areas were created, with music playing while people were being killed behind their walls, so that the screams of the dying family members could not be heard. "And I haven't even mentioned the horrors of Hitler's concentration camps or the mass killings of Stalin. Our history is a sequence of horrific acts against ourselves, and this also extends to nature. We have known about climate change and our influence on our fragile biosphere since the middle of the last century. All that this knowledge has resulted in is dinner-party talk about how important it is to recycle household waste, how awful the killing of the rain forest is, and how terrible the continent-sized carpet of waste floating in the ocean. We like to share videos of turtles choking on plastic straws, or dolphins dying in fishing nets, being shocked to our core. "But who was willing to go without their cosmetic creams? Who refused plastic bags at the supermarket? Who ordered Long Island iced tea with no straw? Who lived without a smartphone, or their car that ran on gas? Who didn't buy any product containing palm oil, to protect the rain forest? Nobody. Our horror only lasts until it gets in the way of our habits, even though I'm sure we all have the best of intentions. Humanity is a sickness that spreads quicker than the organism of the universe can deal with them.

Calvert, Joshua T. Ganymede Rises. Kindle Edition.

Further Reading

Paul Thurrott's "Windows Everywhere" 900 plus page (150MB) tome, and it is very good. I think this will go down as the Ultimate Windows Storybook Encyclopedia. It is published on Leanpub.com.

Who is Paul Thurrott?

Paul Thurrott is a well-known technology journalist, author, and podcaster, based in the United States. He is best known for his work covering Microsoft products and services, including Windows, Office, and the Xbox, as well as for his website, Thurrott.com, which provides news, reviews, and analysis of the technology industry.

Thurrott has been writing about technology for over 25 years, and has authored or co-authored numerous books on technology topics, including "Windows 10 Field Guide," "Office 365 for IT Pros," and "Windows Vista Secrets." He has also contributed to many technology publications, including PC Magazine, PC World, and Windows IT Pro.

In addition to his writing, Thurrott is a co-host of the Windows Weekly podcast, which covers Microsoft-related news and events, and he has appeared as a guest on many other technology-related podcasts and shows. He is widely respected in the technology industry for his deep knowledge of Microsoft products and services, as well as for his insightful commentary and analysis.

Persons of Note

Bob Metcalfe

Turing Award[20] Won by Co-Inventor of Ethernet Technology

In the 1970s, Bob Metcalfe helped develop the primary technology that lets you send email or connect with a printer over an office network. From a report:

In June 1972, Bob Metcalfe, a 26-year-old engineer fresh out of graduate school, joined a new research lab in Palo Alto, Calif., as it set out to build something that few people could even imagine: a personal computer. After another engineer gave up the job, Dr. Metcalfe was asked to build a technology that could connect the desktop machines across an office and send information between them. The result was Ethernet, a computer networking technology that would one day become an industry standard. For decades, it has connected PCs to servers, printers and the Internet in corporate offices and homes across the globe.

For his work on Ethernet, the Association for Computing Machinery, the world's largest society of computing professionals, announced on Wednesday that Dr. Metcalfe, 76, would receive this year's Turing Award. Given since 1966 and often called the Nobel Prize of computing, the Turing Award comes with a $1 million prize. When Dr. Metcalfe arrived at the Palo Alto Research Center -- a division of Xerox nicknamed PARC -- the first thing he did was connect the lab to the Arpanet, the wide-area network that later morphed into the modern Internet. The Arpanet transmitted information among about 20 academic and corporate labs across the country. But as PARC researchers designed their personal computer, called the Alto, they realized they needed a network technology that could connect personal computers and other devices within an office, not over long distances.

"Ethernet is right up there with magnetic resonance imaging, the LP record, air bags, and soft contact lenses. So says the National Inventors Hall of Fame, which included Bob Metcalfe, inventor of the ubiquitous LAN technology, in its latest round of inductees."

David Boggs

David Boggs, an electrical engineer and computer scientist who helped create Ethernet, the computer networking technology that connects PCs to printers, other devices and the Internet in offices and homes, died on Feb. 19 in Palo Alto, Calif. He was 71. From a report:

His wife, Marcia Bush, said his death, at Stanford Hospital, was caused by heart failure. In the spring of 1973, just after enrolling as a graduate student at Stanford University, Mr. Boggs began an internship at Xerox PARC, a Silicon Valley research lab that was developing a new kind of personal computer. One afternoon, in the basement of the lab, he noticed another researcher tinkering with a long strand of cable.

The researcher, another new hire named Bob Metcalfe, was exploring ways of sending information to and from the lab's new computer, the Alto. Mr. Metcalfe was trying to send electrical pulses down the cable, and he was struggling to make it work. So Mr. Boggs offered to help. Over the next two years, they designed the first version of Ethernet. "He was the perfect partner for me," Mr. Metcalfe said in an interview. "I was more of a concept artist, and he was a build-the-hardware-in-the-back-room engineer." Many of the key technologies that would be developed over the next two decades as part of the Alto project would come to define the modern computer, including the mouse, the graphical user interface, the word processor and the laser printer, as well as Ethernet.

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[20] The ACM A. M. Turing Award is an annual prize given by the Association for Computing Machinery (ACM) for contributions of lasting and major technical importance to computer science. It is generally recognized as the highest distinction in computer science and is colloquially known as or often referred to as the "Nobel Prize of Computing". The award is named after Alan Turing, who was a British mathematician and reader in mathematics at the University of Manchester. Wikipedia

Richard M. Stallman

Richard Matthew Stallman born March 16, 1953, also known by his initials, rms, is an American free software movement activist and programmer. He campaigns for software to be distributed in such a manner that its users have the freedom to use, study, distribute, and modify that software. Software that ensures these freedoms is termed free software. Stallman launched the GNU Project, founded the Free Software Foundation (FSF) in October 1985, developed the GNU Compiler Collection and GNU Emacs, and wrote the GNU General Public License.

Stallman launched the GNU Project in September 1983 to write a Unix-like computer operating system composed entirely of free software. With this, he also launched the free software movement. He has been the GNU project's lead architect and organizer, and developed a number of pieces of widely used GNU software including, among others, the GNU Compiler Collection, GNU Debugger, and GNU Emacs text editor.

Stallman pioneered the concept of copyleft, which uses the principles of copyright law to preserve the right to use, modify, and distribute free software. He is the main author of free software licenses which describe those terms, most notably the GNU General Public License (GPL), the most widely used free software license.

In 1989, he co-founded the League for Programming Freedom. Since the mid-1990s, Stallman has spent most of his time advocating for free software, as well as campaigning against software patents, digital rights management (which he refers to as digital restrictions management, calling the more common term misleading), and other legal and technical systems which he sees as taking away users' freedoms. This has included software license agreements, non-disclosure agreements, activation keys, dongles, copy restriction, proprietary formats, and binary executables without source code.

Alan Cooper

Alan Cooper (born June 3, 1952) is an American software designer and programmer. Widely recognized as the "Father of Visual Basic",[1] Cooper is also known for his books About Face: The Essentials of Interaction Design and The Inmates Are Running the Asylum: Why High-Tech Products Drive Us Crazy and How to Restore the Sanity. As founder of Cooper, a leading interaction design consultancy, he created the Goal-Directed design methodology and pioneered the use of personas as practical interaction design tools to create high-tech products. On April 28, 2017, Alan was inducted into the Computer History Museum's Hall of Fellows "for his invention of the visual development environment in Visual BASIC, and for his pioneering work in establishing the field of interaction design and its fundamental tools.

Dave Cutler

David Neil Cutler Sr. (born March 13, 1942) is an American software engineer. He developed several computer operating systems, and is known for developing several widely-used commercial operating systems: Microsoft: Windows NT, Digital Equipment Corporation: RSX-11M, VMS, VAXELN, and MICA.

Cutler holds at least 20 patents, and is affiliate faculty in the Computer Science Department at the University of Washington.

Cutler was elected a member of the National Academy of Engineering in 1994 for the design and engineering of commercially successful operating systems. Cutler was awarded the prestigious status of Senior Technical Fellow at Microsoft.

Cutler is also well known for his disdain for ther Unix computer operating system. Said one team member who worked with Cutler: Unix is like Cutler's lifelong foe. It's like his Moriarty[21]. He thinks Unix is a junk operating program designed by a committee of PhDs.

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[21] Professor James Moriarty is a fictional character and criminal mastermind created by Sir Arthur Conan Doyle to be a formidable enemy for the author's fictional detective Sherlock Holmes. He was created primarily as a device by which Doyle could kill Holmes and end the hero's stories. Wikipedia

There's never been one mind behind the whole thing, and it shows. So he's always been out to get Unix.

He has been recognized as a 2007 National Medal of Technology and Innovation Laureate, awarded on 29 September 2008 at a White House ceremony in Washington, DC.

He has been honored as a Computer History Museum Fellow on 16 April 2016 at the Computer History Museum in Mountain View, California.

Michael Abrash

Lefty Abrash is an American programmer and technical writer specializing in code optimization and graphics. Since 2014, he has been the chief scientist of Oculus VR, a subsidiary of Meta Platforms.

Abrash started his career in 1982 writing video games for the then-new IBM PC, which eventually resulted in the 1990 book Zen of Assembly Language Volume 1: Knowledge.He wrote about IBM PC compatible graphics programming for Programmer's Journal in the late 1980s, followed by a column for Dr. Dobb's Journal in the early 1990s. He worked on the rendering technology for Quake at id Software which he wrote publicly about. His columns and other writings were compiled into several books on graphics programming. He later wrote the Pixomatic software renderer for RAD Game Tools.

Abrash was a video game programmer in the early days of the IBM PC and the Color Graphics Adapter. His first commercial game was a clone of Space Invaders published by Datamost in 1982 as Space Strike[5] followed by Cosmic Crusader (1982) and Big Top (1983), both published by Funtastic. Working with Dan Illowsky, who had previously written the Apple II Pac-Man clone Snack Attack, he co-wrote Snack Attack II (1982) for the IBM PC.

After working at Microsoft on graphics and assembly code for Windows NT 3.1, he was hired by id Software in the mid-1990s to work on Quake. Some of the technology behind Quake is documented in Abrash's Ramblings in Realtime published in Dr. Dobb's Journal. He mentions Quake as his favourite game of all time After Quake was released, Abrash returned to Microsoft to work on natural language research, then moved to the Xbox team, until 2001.

Philip (Don) Estridge

Philip (Don) Estridge was serving as the IBM vice president, manufacturing, when he died in a plane crash, along with his wife, Mary Ann, on August 2, 1985. IBM's president and chief executive officer John F. Akers said at the time: "Don Estridge was a man of vision whose skill and leadership helped guide IBM's personal computer business to success. He had a very bright future in our business. He and Mary Ann will be greatly missed by all their friends and colleagues."

In 1981, Estridge had been named director, Entry Systems Business, responsible for the IBM Personal Computer, which was introduced on August 12 of that year. He later became general manager of Entry Systems in the System Products Division and was appointed an IBM vice president in 1984.

Jon Postel

Jonathan Bruce Postel August 6, 1943 – October 16, 1998) was an American computer scientist who made many significant contributions to the development of the Internet, particularly with respect to standards. He is known principally for being the Editor of the Request for Comment (RFC) document series, for Simple Mail Transfer Protocol (SMTP), and for administering the Internet Assigned Numbers Authority (IANA) until his death.

Daniel Kaminsky

Daniel Kaminsky (February 7, 1979 – April 23, 2021) was an American computer security researcher. He was a co-founder and chief scientist of WhiteOps, a computer security company. He previously worked for Cisco, Avaya, and IOActive, where he was the director of penetration testing. The New York Times labeled Kaminsky an "Internet security savior" and "a digital Paul Revere".

Kaminsky was known among computer security experts for his work on DNS cache poisoning, for showing that the Sony Rootkit had infected at least 568,000 computers, and for his talks at the Black Hat Briefings. On June 16, 2010, he was named by ICANN as one of the Trusted Community Representatives for the DNSSEC root.

Kaminsky died on April 23, 2021, of diabetic ketoacidosis at his home in San Francisco. He had been frequently hospitalized for the disease in prior years. After his death, he received tributes from the Electronic Frontier Foundation, which called him a "friend of freedom and embodiment of the true hacker spirit", and from Jeff Moss, who said Kaminsky should be in the Internet Hall of Fame. On Dec 14, 2021, that wish came to fruition.

John D. Carmack II

John D. Carmack II (born August 20, 1970) is an American computer programmer and video game developer. He co-founded the video game company id Software and was the lead programmer of its 1990s games Commander Keen, Wolfenstein 3D, Doom, Quake, and their sequels. Carmack made innovations in 3D computer graphics, such as his Carmack's Reverse algorithm for shadow volumes. In 2013, he resigned from id Software to work full-time at Oculus VR as their CTO. In 2019, he reduced his role to Consulting CTO so he could allocate more time toward artificial general intelligence (AGI) In 2022, he left Oculus to work on his startup, Keen Technologies.

"If I have seen further, it is by standing on the shoulders of giants." Sir Isaac Newton

Questions for the author

Write to the author at lefty at tcw dot org

Q. What led you to seek out and explore Space?

A. I have pretty much covered terrestrial hacking in my first four books. This was the next frontier to go to.

Q. Why do you have so many computers, wouldn't two or three be enough?

A. I have a Win7 laptop four monitor writing machine, and also my email and podcast machine.
An identical Win7 three monitor laptop personal machine, email, scanning etc.
A low profile small form factor machine, formerly used as a Win8 test machine, now a Win7 expendable machine I use to test dubious software and websites. Connected to my 55 inch TV when necessary.
My high performance Win7 desktop tower connected to the 47 inch which I used for my DW research and now mostly for streaming movies, as well as VPN, and Virtual Machine activities.
A Win7 tablet sitting idle except when needed that I used to use for Kindle books.
A Win10 media center PC that I use to stream movies, play DVD's for movie nights.
A Win 10 tablet that I use for reading Kindle books. In the living room:
A Win10 tablet that the wife uses to WiDi to the 60 inch to watch her streaming movies.
A NUC that the wife uses for Amazon and other shopping and email.
A desktop tower, demoted from primary use to a surround sound music player for when I work in the garage.. The acoustics are great and the sound is amazing.

This reminds that I once heard Jackson Browne tell a story in concert about when he first learned about how Steven Stills had a whole trailer of guitars with him on tour. At the time he that that was just so decadent. But now however on stage surrounded by his own guitars, he had to admit that at that point he just didn't yet understand guitars.

Q. Why are you so insistent on computer security?

A. I simply want to have control over the infiltration and exfiltration of who and what is and are in my computer systems. No one belongs there unless invited whether it be ads, malware, data harvesters, or software updates. I did not give Corporate America Eminent Domain over my computer systems and personal life. This is no different than your house or apartment. You exert control over who and what comes and goes in your home.

As for some of the technical:

I use both the Brave browser with Brave Search, the Firefox browser with StartPage search and the Ghostery (Adblock), DuckDuckGo Privacy Essentials, Privacy Badger, JShelter, browser extensions. I am also blocking ads at my router.

I have also been known to use TMAC to change my Mac address, Zone Alarm for antivirus and firewall, Malwarebytes for antimalware, and SpyShelter for an anti-keylogger.

Many more details on computer CW and DW Internet OpSec in my third and fourth books.

Music Playlist

The following file playlist was created during the writing of this book. They can be downloaded here, in mp3 or flac formats: https://free-mp3-download.net/

AC-DC - Hells Bells.flac
AC-DC - Rock N Roll Dream.flac
Annie Lennox - Why.flac
Arlo Guthrie - Alice-'s Restaurant (The Massacree Revisted).flac
Arlo Guthrie - Alice-'s Restaurant Massacree.flac
Arlo Guthrie - Coming into Los Angeles.flac
Arlo Guthrie - This Land Is Your Land.flac
Atlanta Rhythm Section - Doraville.flac
Atlanta Rhythm Section - So into You.flac
Atlanta Rhythm Section - Spooky.flac
B.B. King - All Over Again.flac
B.B. King - Never Make Your Move Too Soon.flac
Bob Dylan - Desolation Row.flac
Bob Dylan - Lily, Rosemary and the Jack of Hearts.flac
Bob Dylan - Mississippi.flac
Bob Dylan - My Back Pages.flac
Bob Dylan - Shelter from the Storm.flac
Bob Dylan - Tangled up in Blue.flac
Bob Seger & The Silver Bullet Band - Against The Wind.flac
Bob Seger & The Silver Bullet Band - Shame On The Moon.flac
Bonnie Raitt - Angel from Montgomery.flac
Bonnie Raitt - I Can-'t Make You Love Me.flac
Boston - More Than a Feeling.flac
Boz Scaggs - Loan Me A Dime.flac
Brian Setzer - Summertime Blues.flac
Bruce Springsteen - Across the Border.flac
Bruce Springsteen - Factory.flac
Bruce Springsteen - My City of Ruins.flac
Bruce Springsteen - Racing in the Street.flac
Bruce Springsteen - Thunder Road.flac
Byther Smith - 35 Long Years.flac
Carole King - So Far Away.flac
Carole King - Will You Love Me Tomorrow.flac
Carole King - You-'ve Got a Friend.flac
Counting Crows - Goodnight Elisabeth live.flac
Counting Crows - Goodnight Elisabeth.flac
Creedence Clearwater Revival - Born On The Bayou(1).flac

Creedence Clearwater Revival - I Put A Spell On You.flac
Creedence Clearwater Revival - Suzie Q.flac
Dan Fogelberg - Same Old Lang Syne.flac
Dave Matthews Band - Cortez, The Killer.flac
Dave Matthews Band - So Much to Say.flac
Dave Matthews Band - Where Are You Going.flac
Dave Matthews-Don_t-Drink-the-Water.flac
David Gilmour - Comfortably Numb.flac
David Gilmour - Wish You Were Here.flac
Deep Purple - Highway Star.flac
Deep Purple - Smoke On The Water.flac
Don Henley - New York Minute.flac
Don Henley - Sunset Grill.flac
Don Henley - The Heart Of The Matter.flac
Don McLean - American Pie.flac
Don McLean - Vincent.flac
Donovan - Season of the Witch.flac
Eddie Money - Gimme Some Water.flac
Electric Light Orchestra - Roll Over Beethoven.flac
Electric Light Orchestra - Showdown.flac
Elton John - Burn Down The Mission.flac
Elton John - Country Comfort.flac
Eric_Guitar_Davis-Trouble.flac
Fleetwood Mac - Destiny Rules.flac
Fleetwood Mac - Peacekeeper.flac
Fleetwood Mac - Sisters of the Moon.flac
Fleetwood Mac - Thrown Down.flac
Foo Fighters-Over-and-Out.flac
Genesis - No Son Of Mine.flac
George Harrison - Baltimore Oriole.flac
George Harrison - Beware Of Darkness (Acoustic).flac
George Harrison - Cheer Down.flac
George Harrison - Horse To The Water.flac
George Harrison - Isn't It A Pity (Version Two).flac
George Harrison - Marwa Blues.flac
George Harrison - Roll Over Beethoven.flac
George Harrison - This Guitar (Can't Keep From Crying) (Platinum Blues Version _ Bonus Track).flac
George Harrison - While My Guitar Gently Weeps.flac
Gladys Knight & The Pips - Midnight Train to Georgia.flac
Glen Campbell - Wichita Lineman.flac
Gordon Lightfoot - The Wreck of the Edmund Fitzgerald.flac
Gov-'t Mule - Ain’t No Love In The Heart Of The City.flac

Gov-'t Mule - If Heartaches Were Nickels.flac
Gov-'t Mule - Sad And Deep As You.flac
Grateful Dead - Althea.flac
Grateful Dead - Box of Rain.flac
Grateful Dead - Morning Dew.flac
Harry Chapin - A Better Place to Be.flac
Harry Chapin - Mr. Tanner.flac
Harry Chapin - What Made America Famous.flac
Heart - Dreamboat Annie.flac
Jackson Browne - Alive in the World.flac
Jackson Browne - Casino Nation.flac
Jackson Browne - For Everyman.flac
Jackson Browne - Late for the Sky.flac
Jackson Browne - Sky Blue and Black.flac
Jackson Browne - Sleep-'s Dark and Silent Gate.flac
Jackson Browne - The Arms of Night.flac
Jackson Browne & David Lindley - Late For The Sky.flac
Jackson Browne & David Lindley - Looking East.flac
Jackson Browne & David Lindley - Mercury Blues.flac
Jackson Browne & David Lindley - Take It Easy.flac
Jackson Rohm-Four-on-the-Floor.flac
James Taylor - Up On The Roof.flac
Janis Ian - Jesse.flac
Janis Ian - Stars.flac
Jeff Healey - As the Years Go Passing By.flac
Jethro Tull - Aqualung.flac
Jethro Tull - Farm on the Freeway.flac
Jethro Tull - Locomotive Breath.flac
Jethro Tull - Rocks on the Road.flac
Jimi Hendrix - All Along The Watchtower.flac
Joan Baez - Diamonds And Rust.flac
Joanne Shaw Taylor - Summertime (Live).flac
Joe Bonamassa - I-'ll Take Care of You.flac
Joe Bonamassa - Never Make Your Move Too Soon (Live).flac
Joe Walsh - Help Me Thru The Night.flac
Joe Walsh - Rocky Mountain Way.flac
Joe Walsh - Second Hand Store.flac
Joe Walsh - Turn To Stone.flac
Joe Walsh-Analog-Man.flac
John Fogerty - A Hundred And Ten In The Shade.flac
John Fogerty - I Heard It Through The Grapevine.flac
John Fogerty - Run Through The Jungle.flac
John Lennon - How Do You Sleep.flac

John Lennon - I'm Losing You (2010 Remix).flac
John Lennon - Imagine.flac
John Lennon - Scared.flac
John Lennon - Steel And Glass.flac
John Lennon - Watching The Wheels.flac
John Mellencamp - Ain-'t Even Done With The Night.flac
John Mellencamp - Get A Leg Up.flac
John Mellencamp - Rain On The Scarecrow.flac
John Mellencamp - Someday.flac
John Mellencamp - What If I Came Knocking.flac
John Prine - Ain-'t Hurtin-' Nobody.flac
John Prine - Hello in There.flac
John Prine - Sam Stone.flac
Johnny Cash - Hurt.flac
Johnny Rivers - Secret agent man.flac
Joni Mitchell - River.flac
Jools Holland - Horse To The Water.flac
Kansas - Miracles out of Nowhere.flac
Kenny Rogers - Just Dropped in (To See What Condition My Condition Was In) (Re-Recording).flac
Kid Rock - Born Free.flac
Kid Rock - Collide (feat. Sheryl Crow & Bob Seger).flac
Kid Rock - God Save Rock n Roll.flac
Led Zeppelin - Babe I-'m Gonna Leave You.flac
Led Zeppelin - Kashmir.flac
Led Zeppelin - Stairway to Heaven.flac
Lefty Insider - Got the Spectrum Blues.flac
Leo Sayer - The Wrong Man.flac
Linda Ronstadt - Blue Bayou.flac
Linda Ronstadt - Poor Poor Pitiful Me.flac
Loggins and Messina-Live- Sittinin Again at Santa Barbara Bowl-Angry-Eyes.flac
Loggins and Messina-Live- Sittinin Again at Santa Barbara Bowl-Same-Old-Wine.flac
Lynyrd Skynyrd - Free Bird.flac
Lynyrd Skynyrd - Simple Man.flac
Mark Knopfler - Are We In Trouble Now.flac
Mark Knopfler - Brothers In Arms.flac
Mark Knopfler - Sultans Of Swing.flac
Meat Loaf - I-'d Do Anything For Love (But I Won-'t Do That).flac
Meat Loaf - Paradise By the Dashboard Light.flac
Meat Loaf - Two Out of Three Ain-'t Bad.flac

Meat Loaf - You Took The Words Right Out of My Mouth (Hot Summer Night).flac
Mike Oldfield - Tubular Bells.flac
Mott the Hoople - All The Way From Memphis.flac
Mott the Hoople - I Wish I Was Your Mother.flac
Neil Diamond - Dry Your Eyes.flac
Neil Diamond - Kentucky Woman.flac
Neil Young - A Man Needs a Maid.flac
Neil Young - Cinnamon Girl.flac
Neil Young - Cortez the Killer.flac
Neil Young - Cowgirl in the Sand.flac
Neil Young - Down by the River.flac
Neil Young - Helpless.flac
Neil Young - Pocahontas.flac
Neil Young - Ramada Inn.flac
Neil Young - Thrasher.flac
Paul McCartney - Ain-'t No Sunshine.flac
Paul McCartney - Band On The Run.flac
Paul McCartney - Early Days.flac
Paul McCartney - Hey Jude.flac
Paul McCartney - Let It Be.flac
Paul McCartney - Uncle Albert _ Admiral Halsey (2012 Remaster).flac
Peter Frampton - Do You Feel Like We Do.flac
Peter Frampton - Lines On My Face.flac
Peter Green - A Fool No More.flac
Phil Collins - Another Day in Paradise.flac
Phil Collins - I Wish It Would Rain Down.flac
Phil Collins - In the Air Tonight.flac
Pink Floyd - Pigs (Three Different Ones).flac
Pink Floyd - The Great Gig In The Sky.flac
Pink Floyd - Us And Them.flac
Pretenders - Revolution.flac
Procol Harum - A Whiter Shade of Pale.flac
Ray Charles - Georgia On My Mind.flac
REO Speedwagon - 157 Riverside Avenue.flac
REO Speedwagon - Can-'t Fight This Feeling.flac
REO Speedwagon - Golden Country.flac
Ringo Star - I Was Walkin'.flac
Ringo Star - Wings.flac
Robbie Robertson - This Is Where I Get Off.flac
Robin Trower - About to Begin.flac
Robin Trower - Bridge of Sighs.flac
Robin Trower - In This Place.flac

Rod Stewart - Cut Across Shorty.flac
Rod Stewart-Unplugged-Maggie-May.flac
Ronnie Earl - Blues For The West Side.flac
Roxy Music - Love Is The Drug.flac
Roy Orbison - In Dreams.flac
Santana - Black Magic Woman - Gypsy Queen.flac
Santana - Europa (Earth-'s Cry Heaven-'s Smile).flac
Santana - Samba Pa Ti.flac
Savoy Brown - Hellbound Train.flac
Savoy Brown - Hold Your Fire.flac
Savoy Brown - Just Cos-' You Got The Blues Don-'t Mean You Gotta Sing.flac
Savoy Brown - Ride On Babe.flac
Sheryl Crow - If It Makes You Happy.flac
Steely Dan - Brooklyn (Owes The Charmer Under Me).flac
Steely Dan - Dirty Work.flac
Steely Dan - Do It Again.flac
Steve Miller Band - Wide River.flac
Steve Winwood - Can-'t Find My Way Home live.flac
Supertramp - Child Of Vision.flac
The Allman Brothers Band - Melissa.flac
The Allman Brothers Band - Midnight Rider.flac
The Allman Brothers Band - Whipping Post.flac
The Allman Brothers Band - Worried Down with the Blues.flac
The Band - Blind Willie McTell.flac
The Band - It Makes No Difference.flac
The Band - The Last Waltz Suite Out of the Blue.flac
The Band - Who Do You Love (feat. Ronnie Hawkins).flac
The Beach Boys - In My Room.flac
The Beatles - Free As A Bird.flac
The Beatles - I Saw Her Standing There.flac
The Beatles - Let It Be.flac
The Beatles - Rain.flac
The Beatles - Twist And Shout.flac
The Blues Brothers - Minnie the Moocher.flac
The Blues Brothers - Shot Gun Blues.flac
The Blues Brothers - Sweet Home Chicago.flac
The Byrds - I-'ll Feel a Whole Lot Better.flac
The Byrds - Lover of the Bayou.flac
The Chicks - Not Ready to Make Nice.flac
The Chicks - Travelin-' Soldier.flac
The Doobie Brothers live - Ukiah.flac
The Eagles - Desperado.flac

The Eagles - Hotel California.flac
The Eagles - Long Road Out of Eden.flac
The Eagles - New York Minute.flac
The Eagles - The Last Resort.flac
The Fray-How to Save a Life-Dead-Wrong.flac
The Highwaymen - (Ghost) Riders in the Sky.flac
The Hollies - Long Cool Woman In A Black Dress.flac
The Kinks - Celluloid Heroes.flac
The Kinks - You Really Got Me.flac
The Milk Carton Kids - Michigan.flac
The Milk Carton Kids - Wish You Were Here.flac
The Monkees - Last Train to Clarksville.flac
The Rolling Stones - Can-'t You Hear Me Knocking.flac
The Rolling Stones - Time Waits For No One.flac
The Rolling Stones - Wild Horses acoustic.flac
The Temptations - I Wish It Would Rain.flac
The Temptations - Just My Imagination (Running Away With Me).flac
The Temptations - Papa Was a Rollin-' Stone (Live).flac
The Temptations - Papa Was A Rollin-' Stone.flac
The Traveling Wilburys - Last Night.flac
The Traveling Wilburys - Margarita.flac
The Traveling Wilburys - Runaway.flac
The Traveling Wilburys - The Devil-'s Been Busy.flac
The Traveling Wilburys - Tweeter And The Monkey Man.flac
The Wallflowers-From-the-Bottom-of-My-Heart.flac
The Wallflowers-Its-a-Dream.flac
The Who - Real Good Looking Boy.flac
The Young Rascals - In the Midnight Hour.flac
The Young Rascals - Mustang Sally.flac
Tom Petty - Crawling Back to You.flac
Tom Petty - It-'s Good to Be King.flac
Tom Petty - Melinda.flac
Tom Petty - Running Down a Dream.flac
Tom Petty and the Heartbreakers - Free Fallin-'.flac
Tom Petty and the Heartbreakers - Handle With Care.flac
Tom Petty and the Heartbreakers - I Need You.flac
Tom Petty and the Heartbreakers - Rhino Skin.flac
Tom Petty and the Heartbreakers - Straight Into Darkness.flac
Tom Waits - Time.flac
Tommy Tutone - 8675309 Jenny Jenny.flac
Tori Amos - Time.flac
Tori Amos-Pretty Good Year-Pretty Good Year.flac
Traffic - Rainmaker.flac

Traffic - The Low Spark Of High-Heeled Boys.flac
U2 - A Man And A Woman.flac
U2- A Man and a Woman.flac
Van Morrison - Big Time Operators.flac
Van Morrison - Gloria.flac
Van Morrison - Into the Mystic.flac
Warren Hayes - Fallen Down.flac
Warren Haynes - Angel-City.flac
Warren Haynes - Do You Feel Like We Do.flac
Warren Haynes - Is It Me Or You.flac
Warren Haynes Band - Pretzel Logic.flac
Warren Zevon - Carmelita.flac
Warren Zevon - Desperados Under the Eaves.flac
Willie Nelson - Bring It On.flac
Willie Nelson - Hands on the Wheel.flac
Willie Nelson - Hard to Be an Outlaw.flac
Wishbone Ash - Sometime World.flac
Wishbone Ash - Throw Down The Sword.flac
Yusuf - Cat Stevens - Father And Son.flac
ZZ Top - Blue Jean Blues.flac
ZZ Top - Jesus Just Left Chicago.flac

I am reminded that I once heard Jackson Browne tell a story in concert about when he first learned that Steven Stills had a whole trailer of guitars with him on his concert tour. At the time he thought that this was just so decadent and over the top. But now however on stage surrounded by his own guitars, he had to admit that he just didn't yet understand guitars at that point in his career.

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https://www.alamy.com/stock-photo/satellite-orbiting-earth.html?sortBy=relevant

Routing and Quality-of-Service in Broadband LEO Satellite Networks (Broadband Networks and Services Book 2) 2003rd Edition, Kindle Edition by Hoang Nam Nguyen

Ground Station Design and Analysis for LEO Satellites: Analytical, Experimental and Simulation Approach 1st Edition, Kindle Edition by Shkelzen Cakaj (Author) Format: Kindle Edition

Evaluation of Routing Algorithm for LEO Satellite Networks: Routing Alogrithm for the Low Earth Orbit Satellites Paperback – June 21, 2016 by Keyur Chauhan

Satellite Communications Systems: Systems, Techniques and Technology 6th Edition by Gerard Maral and Michel Bousquet

The updated 6th edition of the authoritative and comprehensive textbook to the field of satellite communications engineering

The revised and updated sixth edition of Satellite Communications Systems contains information on the most recent advances related to satellite communications systems, technologies, network architectures and new requirements of services and applications. The authors – noted experts on the topic – cover the state-of-the-art satellite communication systems and technologies and examine the relevant topics concerning communication and network technologies, concepts, techniques and algorithms. New to this edition is information on Internetworking with the broadband satellite systems, more intensive coverage of Ka band technologies, GEO high throughput satellite (HTS), LEO constellations and the potential to support the current new broadband Internet services as well as future developments for global information infrastructure.

The authors offer details on digital communication systems and broadband networks in order to provide high-level researchers and professional engineers an authoritative reference. In addition, the book is designed in a user-friendly format. This important text:

Puts the focus on satellite communications and networks as well as the related applications and services

Provides an essential, comprehensive and authoritative updated guide to the topic

Contains new topics including the space segment, ground, ground satellite control and network management, relevant terrestrial networks and more

Includes helpful illustrations, tables and problems to enhance learning

Offers a summary at the beginning of each chapter to help understand the concepts and principles discussed

Written for research students studying or researching in the areas related to satellite communications systems and networks, the updated sixth edition of Satellite Communications Systems offers an essential guide to the most recent developments

in the field of satellite communications engineering and references to international standards.

The updated 6th edition of the authoritative and comprehensive textbook to the field of satellite communications engineering

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Delay-Tolerant Satellite Networks (Space Technology and Applications) Kindle Edition

by Juan A. Fraire and Jorge M. Finochietto Format: Kindle Edition

Satellite Network Robust QoS-aware Routing 2014th Edition, Kindle Edition by Fei Long Format: Kindle Edition

Satellite Network Robust QoS-aware Routing presents a novel routing strategy for satellite networks. This strategy is useful for the design of multi-layered satellite networks as it can greatly reduce the number of time slots in one system cycle. The traffic prediction and engineering approaches make the system robust so that the traffic spikes can be handled effectively. The multi-QoS optimization routing algorithm can satisfy various potential user requirements. Clear and sufficient illustrations are also presented in the book. As the chapters cover the above topics independently, readers from different research backgrounds in constellation design, multi-QoS routing, and traffic engineering can benefit from the book.

Fei Long is a senior engineer at Beijing R&D Center of 54th Research Institute of China Electronics Technology Group Corporation.

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Satellite Communications Network Design and Analysis Kindle Edition y Kenneth Y. Jo Format: Kindle Edition

This authoritative book provides a thorough understanding of the fundamental concepts of satellite communications (SATCOM) network design and performance assessments. You find discussions on a wide class of SATCOM networks using satellites as core components, as well as coverage key applications in the field. This in-depth resource presents a broad range of critical topics, from geosynchronous Earth orbiting (GEO) satellites and direct broadcast satellite systems, to low Earth orbiting (LEO) satellites, radio standards and protocols. This invaluable reference explains the many specific uses of satellite networks, including small-terminal wireless and mobile communications systems. Moreover, this book presents advanced topics such as satellite RF link analyses, optimum transponder loading, on-board processing, antenna characteristics, protected systems, information assurance, and spread spectrums. You are introduced to current and future SATCOM systems and find details on their performance supportabilities. This cutting-edge book also presents trends in multimedia satellite applications and IP services over satellites.

Terrestrial-Satellite Communication Networks: Transceivers Design and Resource Allocation (Wireless Networks) 1st ed. 2018 Edition, Kindle Edition

by Linling Kuang and Chunxiao Jiang Format: Kindle Edition

This book targets major issues in terrestrial-satellite communication networks and presents the solutions. While the terrestrial networks can achieve high-speed data service at low cost, satellite based access is one way to complement terrestrial based networks to ensure ubiquitous, 100% geographic coverage. The coexistence and cooperation between terrestrial and satellite networks are of great potential in future communication networks, and satellite radio access networks has already been considered in the fifth-generation (5G) networks to be supported for phase 2. Therefore, it is important to study the architectures of terrestrial-satellite networks, as well as the possible techniques and challenges.

The authors introduce the technique of beamforming in satellite communication systems, which is an efficient transmitting method for multiple access, and they discuss the main challenges as well as prospective applications. The authors introduce possible methods for interference cancelation reception in terrestrial-satellite communication networks when reusing the frequency band between the two networks. Due to the limitation of spectrum resources, spectrum sharing will become one of the important issues in terrestrial-satellite communication networks. The problems of spectrum coexistence between GEO and Terrestrial Systems and between GEO and NEGO systems are also discussed.

Finally, taking both the two system into consideration, the resource allocation problem will be more complex due to the coupling between resources and the

interference. Based on this, the authors propose several resource allocation schemes in different scenarios of terrestrial-satellite communication networks, which can optimize the capacity performance of the system. The expected audience for this book includes (but not limited to) graduate students, professors, researchers, scientists, practitioners, engineers, industry managers, and government researchers working in the field of satellite communications and networks.

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Satellite and Terrestrial Hybrid Networks (Iste) 1st Edition, Kindle Edition

by Pascal Berthou and Cédric Baudoin Format: Kindle Edition

This book offers the reader the keys for a successful understanding, integration and usage of satellite systems in addition to next generation terrestrial networks. The DVB-S2/RCS system is used to illustrate the integration challenges. The presentation uses a system approach, i.e. it tackles the terrestrial and satellite telecommunication systems' complexity with a high level approach, focusing on the systems' components and on their interactions. Several scenarios present the different paths that can be followed for the integration of satellite systems in terrestrial networks. Quality of Service management techniques in terrestrial and satellite systems and the solutions to help them to interoperate are provided. Inter-system mobility solutions and performance problems are then addressed. The solutions proposed in this book have been developed within the framework of European and French funded research projects and tested with simulated or real testbeds.

Connections Management Strategies in Satellite Cellular Networks (Iste) 1st Edition, Kindle Edition by Malek Benslama and, Wassila Kiamouche Format: Kindle Edition

This book provides a novel method based on advantages of mobility model of Low Earth Orbit Mobile Satellite System LEO MSS which allows the evaluation of instant of subsequent handover of a MS even if its location is unknown. This method is then utilized to propose two prioritized handover schemes, Pseudo Last Useful Instant PLUI strategy and Dynamic Channel Reservation DCR-like scheme based respectively on LUI and DCR schemes, previously proposed in literature. The authors also approach a different aspect of handover problem: calls with short durations dropped due to a handover failure. We propose a decision system based on fuzzy logic Rescuing System that allows the rescue of calls with short durations facing a premature at the expense of those lasting for long durations.

Networks: Proceedings of the European COST Telecommunications Symposium ... Engineering and Computer Science Book 645) 2002nd Edition, Kindle Edition by A. Nejat Ince (Editor) Format: Kindle Edition

Modeling and Simulation Environment for Satellite and Terrestrial Communications Networks: Proceedings of the European COST Telecommunications Symposium will be of interest to network designers, developers, and operators.

This book is a collection of papers given at the European Cost Telecommunications Symposium. The Symposium was broken down into four sessions:

- Modelling and Simulation.
- Teletraffic Modelling.
- Communications Networks Simulation.
- Problems in Simulation.

Each session addressed a wide spectrum of subjects. The symposium covered nearly all of the important aspects of simulation modeling and tools for the design and performance evaluation of communication techniques and systems. Emerging techniques were emphasized.

Modeling and Simulation Environment for Satellite and Terrestrial Communications Networks: Proceedings of the European COST Telecommunications Symposium is a useful reference work for practicing engineers and academic researchers.

Artificial Intelligence, Machine Learning and Blockchain in Quantum Satellite, Drone and Network Kindle Edition

Quantum computing is a field in which advanced technologies like quantum communication, artificial intelligence and machine learning can be used to secure and speed up connectivity using quantum computers, quantum drones or quantum satellites. This book serve as a foundation for researchers and scientists in this field. Future technologies, such as quantum drone delivery systems, quicker Internet and climate change mitigation, will need quantum information processing and quantum computation. This book deeply explores the importance of quantum computing in real-time applications. It may be used as a reference book for students in higher education, including undergraduate and graduate students, as well as researchers.

Key features:

- Provides a clear insight into the Internet of Drones for academicians, postdoc fellows, research scholars, graduate and postgraduate students, industry fellows and software engineers

- Useful to professionals who seek information about the Internet of Drones, including experts in quantum computing and physics and post-quantum cryptography, as well as data scientists and data analysts

- Covers quantum computing and security for Unmanned Aerial Vehicles (UAV) or drones which are widely useful for applications such as military, government, and non-government systems

- Explores futuristic aspects of the Intenet of Drones to improve everyday living for ordinary people

Editorial Reviews

About the Author

Dr. Thiruselvan Subramanian obtained a Graduate degree in Computer Science from Bharathidasan University Tiruchirappalli, India. He received a Postgraduate degree and Ph.D. in Cloud Computing in the Department of Computer Applications, National Institute of Technology, Tiruchirappalli, India. He worked in Softeon Inc, Chennai, as Project Trainee from February 2010 to June 2010 and as a Software Engineer from June 2010 to August 2011. He worked in Vignan's Foundation for Science, Technology & Research, Guntur as an Assistant Professor from March 2017 to April 2019. He is currently working as Assistant Professor at Presidency University, Bengaluru. His research interest includes Cloud Computing, Decision Theory, and Parallel Programming.

Dr. Archana Dhyani is an Assistant Professor at the University of Petroleum and Energy Studies, Dehradun, India. She has received her Ph.D. in physics from G.B. Pant University of Ag. and Technology, Pantnagar, India in 2009. She has authored several publications including articles in reputed journals and chapters in standard books etc. She has also been an external expert member for National Science Center, Poland and life time member of Indian Physics Association (IPA). She is also in the reviewer panel of many reputed journals. Her current research interest is to study the spectral and transport properties of quantum dot-based nano-junctions for their various applications like quantum computation etc.

Adarsh Kumar is an Associate Professor in the School of Computer Science with University of Petroleum & Energy Studies, Dehradun, India . He received his Master degree (M. Tech) in Software Engineering from Thapar University, Patiala, Punjab, India and earned his PhD degree from Jaypee Institute of Information Technology University, Noida, India followed by Post-Doc from SRI, AIT, Ireland. From 2005 to 2016, he has been associated with the Department of CSE, JIIT, India, where he worked as Assistant Professor. His main research interests are cybersecurity, cryptography, network security, and ad-hoc networks. He has many research papers in reputed journals, conferences and workshops. He participated in one European Union H2020 sponsored research project and he is currently executing two research projects sponsored from UPES SEED division and one sponsored from Lancaster University.

Sukhpal Singh Gill is a Lecturer (Assistant Professor) in Cloud Computing at the School of Electronic Engineering and Computer Science, Queen Mary University of London, UK. Prior to his present stint, Dr. Gill has held positions as a Research Associate at the School of Computing and Communications, Lancaster University, UK and also as a Postdoctoral Research Fellow at CLOUDS Laboratory, The University of Melbourne, Australia. Dr. Gill received his Bachelor's degree in Computer Science and Engineering from Punjab Technical University with Distinction in 2010. Then, he obtained the Degree of Master of Engineering in Software Engineering (Gold Medallist), as well as a Doctoral Degree specialisation in Autonomic Cloud Computing from Thapar University. He was a DST (Department of Science & Technology) Inspire Fellow during his doctoral studies and also worked as a Senior Research Fellow (Professional) on a DST Project sponsored by the

Government of India. One of his research paper has been nominated and selected for the ACM's 21st annual Best of Computing Notable Books and Articles as one of the notable items published in computing — 2016. His research interests include Cloud Computing, Fog Computing, Software Engineering, Internet of Things and Energy Efficiency. For further information, please visit http://www.ssgill.me.

Satellite Communications Systems: Systems, Techniques and Technology 6th Edition, Kindle Edition

The updated 6th edition of the authoritative and comprehensive textbook to the field of satellite communications engineering

The revised and updated sixth edition of Satellite Communications Systems contains information on the most recent advances related to satellite communications systems, technologies, network architectures and new requirements of services and applications. The authors – noted experts on the topic – cover the state-of-the-art satellite communication systems and technologies and examine the relevant topics concerning communication and network technologies, concepts, techniques and algorithms. New to this edition is information on Internetworking with the broadband satellite systems, more intensive coverage of Ka band technologies, GEO high throughput satellite (HTS), LEO constellations and the potential to support the current new broadband Internet services as well as future developments for global information infrastructure.

The authors offer details on digital communication systems and broadband networks in order to provide high-level researchers and professional engineers an authoritative reference. In addition, the book is designed in a user-friendly format. This important text:

- Puts the focus on satellite communications and networks as well as the related applications and services
- Provides an essential, comprehensive and authoritative updated guide to the topic
- Contains new topics including the space segment, ground, ground satellite control and network management, relevant terrestrial networks and more
- Includes helpful illustrations, tables and problems to enhance learning
- Offers a summary at the beginning of each chapter to help understand the concepts and principles discussed

Written for research students studying or researching in the areas related to satellite communications systems and networks, the updated sixth edition of Satellite Communications Systems offers an essential guide to the most recent developments in the field of satellite communications engineering and references to international standards.

Editorial Reviews

From the Inside Flap

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Wireless and Satellite Systems: 7th International Conference, WiSATS 2015, Bradford, UK, July 6-7, 2015. Revised Selected Papers (Lecture Notes of the ... Telecommunications Engineering Book 154) 1st ed. 2015 Edition, Kindle Edition by Prashant Pillai (Editor), Yim Fun Hu (Editor), Ifiok Otung (Editor) Format: Kindle Edition

This book constitutes the proceedings of the 7th International Conference on Wireless and Satellite Services, WiSATS 2015, held in Bradford, UK, in July 2015. The conference was formerly known as the International Conference on Personal Satellite Services (PSATS) mainly covering topics in the satellite domain. As the scope of the conference widened to include wireless systems, the conference was renamed to WiSATS.

The 29 revised papers were presented at the conference in three technical sessions and one special session on “Network Coding for Satellites”. WiSATS 2015 also hosted two workshops along with the main conference: The first workshop, Communication Applications in Smart Grid (CASG 2015), focused on the merging area of using communication technology within the electricity power grid for smart monitoring and control. The second workshop, Advanced Next-Generation Broadband Satellite Systems (BSS 2015), focused on the use of satellite systems for providing next-generation broadband services.

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Satellite Technology: Principles and Applications 3rd Edition, by Anil K. Maini and Varsha Agrawal Format: Kindle Edition

Fully updated edition of the comprehensive, single-source reference on satellite technology and its applications

Covering both the technology and its applications, Satellite Technology is a concise reference on satellites for commercial, scientific and military purposes. The book explains satellite technology fully, beginning by offering an introduction to the fundamentals, before covering orbits and trajectories, launch and in-orbit operations, hardware, communication techniques, multiple access techniques, and link design fundamentals. This new edition also includes comprehensive chapters on Satellite Networks and Satellite Technology – Emerging Trends. Providing a complete survey of applications, from remote sensing and military uses, to navigational and scientific applications, the authors also present an inclusive compendium on satellites and satellite launch vehicles. Filled with diagrams and illustrations, this book serves as an ideal introduction for those new to the topic, as well as a reference point for professionals.

- Fully updated edition of the comprehensive, single-source reference on satellite technology and its applications - remote sensing, weather, navigation, scientific, and military - including new chapters on Satellite Networks and Satellite Technology – Emerging Trends
- Covers the full range of satellite applications in remote sensing, meteorology, the military, navigation and science, and communications, including satellite-to-under sea communication, satellite cell-phones, and global Xpress system of INMARSAT
- The cross-disciplinary coverage makes the book an essential reference book for professionals, R&D scientists and students at post graduate level
- Companion website provides a complete compendium on satellites and satellite launch vehicles

An ideal introduction for Professionals and R&D scientists in the field. Engineering Students. Cross disciplinary information for engineers and technical managers.

Fully updated edition of the comprehensive, single-source reference on satellite technology and its applications

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applications. The book explains satellite technology fully, beginning with an introduction to the fundamentals, before covering other important topics including orbits and trajectories, launch and in-orbit operations, hardware, communication techniques, multiple access techniques, and link design. This new edition also includes two new chapters comprehensively covering networking concepts and emerging trends in satellite technology and its applications, including some unconventional related topics. Providing a complete survey of applications, from weather forecasting, remote sensing and military uses, to navigational and scientific applications, the authors also present an inclusive compendium on satellites and satellite launch vehicles. Filled with diagrams and illustrations, this book serves as an ideal introduction for those new to the topic, as well as a reference point for professionals.

A companion website provides a revised and updated compendium on satellites and satellite launch vehicles. www.wiley.com/go/maini3

CDMA: Access and Switching: For Terrestrial and Satellite Networks by Diakoumis Gerakoulis and Evaggelos Geraniotis Format: Kindle Edition

Taking a close look at an integral part of next generation wireless communications, this book presents SS/CDMA system architecture (Satellite Switched Code Division Multiple Access) and its various communications services. TDMA-based satellite communications as well as related satellite systems and services are also examined in detail.

Satellite Networking: Principles and Protocols 2nd Edition,

by Zhili Sun Format: Kindle Edition

This book provides up to date coverage of the basics of ATM and Internet protocols, and characteristics of satellite networks and Internetworking between satellite and terrestrial networks

Satellite Networking: Principles and Protocols, Second Edition provides up to date information of the original topics in satellite networking and protocols focusing on Internet Protocols (IP) over satellites, broadband over satellites, next generation IP (IPv6) over satellites, new generation of DVB-S/S2 and DVB-RCS next generations and new services and applications. It also includes some analytical techniques for evaluation of end to end IP performance and QoS over satellite, reflecting the recent convergence of telecommunication, Internet, broadcasting and mobile networks.

Topics new to this edition: Internetworking with MANET, DVB-S/S2 and DVB-RCS/RCS2 (including TCP/IP over DVB-S/RCS), recent developments in broadband satellite systems, convergence of services and network technologies (including Internet, telecom, mobile, TV, etc.), radio resource management, PEP, I-PEP, SCPS, traffic modelling and engineering with analysis and examples, and future developments of satellite networking.

- Provides up to date coverage of the basics of ATM and Internet protocols, and characteristics of satellite networks and Internetworking between satellite and

terrestrial networks (e.g. mobile ad hoc networks), including coverage of new services and applications (e.g. Internet, telecom, mobile and TV)

• Discusses the real-time protocols including RTP, RTCP and SIP for real-time applications such as VoIP and MMC, and explains TCP/IP over satellite and evolution of IPv6 over satellite and beyond

This book provides up to date coverage of the fundamental principles and protocols for satellite networking, including satellite orbits and networking concepts, satellite Internetworking with terrestrial networks, B-ISDN and Internet protocols, DVB-S/S2, DVB-RCS/RCS2, satellite-related Internetworking issues, performance enhancement protocol for satellites and future Internet protocols over satellites.

Satellite networking has evolved significantly since the first telecommunications satellite, from telephone and broadcast to broadband and Internet networks. This evolution is also reflected in research and development, including the recent studies of onboard processing, onboard switching and onboard IP routing. There are also continuous research in satellite communications and networks, including resource management, security and quality of service, multicast, video conference and broadband satellite access to the Internet. Additionally, there has also been the development of new generation standards such as DVB-S2, DVB-RCS2 and IPv6networks.

This book will enable the reader to understand the seamless integration between satellite and terrestrial networks and to achieve a common understanding of different network protocols and technologies, and the convergence of future network protocols, technologies, services and applications as well as user terminals. Topics new to this edition include: Internetworking with MANET, DVB-S/S2 and DVB-RCS/RCS2 (including TCP/IP over DVB-S/RCS), recent developments in broadband satellite systems, convergence of services and network technologies (including Internet, telecom, mobile, TV, etc.), traffic modelling and engineering and future developments of satellite networking.

• Introduces satellite communications networks, broadband networks, broadcasting and Internet networks.

• Explores technology developments from circuit to packet switching networks

• Examines concepts protocol reference models and standards, with a focus on satellite-specific issues on networking

• Discusses Internet protocol (IP) over satellite, TCP enhancement over satellite and DVB over satellite (DVB-S/S1 and DVB-RCS/RSC2)

• Provides an introduction to IPv6, the next generation Internet over satellite and network convergence

• Includes a companion website containing electronic versions of the figures (www.wiley.com//legacy/wileychi/sun/)

From the Back Cover

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- Includes a companion website containing electronic versions of the figures (www.wiley.com//legacy/wileychi/sun/)

Satellite Communication Engineering 2nd Edition, by Lefty Olorunfunmi Kolawole Format: Kindle Edition

An undeniably rich and thorough guide to satellite communication engineering, Satellite Communication Engineering, Second Edition presents the fundamentals of information communications systems in a simple and succinct way. This book considers both the engineering aspects of satellite systems as well as the practical issues in the broad field of information transmission. Implementing concepts developed on an intuitive, physical basis and utilizing a combination of applications and performance curves, this book starts off with a progressive foundation in satellite technology, and then moves on to more complex concepts with ease.

What's New in the Second Edition:

The second edition covers satellite and Earth station design; global positioning systems; antenna tracking; links and communications systems; error detection and

correction; data security; regulations and procedures for system modeling; integration; testing; and reliability and performance evaluation.

- Provides readers with the systems building blocks of satellite transponders and Earth stations, as well as the systems engineering design procedure
- Includes the tools needed to calculate basic orbit characteristics such as period, dwell time, coverage area, propagation losses; antenna system features such as size, beamwidth, aperture-frequency product, gain, tracking control; and system requirements such as power, availability, reliability, and performance
- Presents problem sets and starred sections containing basic mathematical development
- Details recent developments enabling digital information transmission and delivery via satellite

Satellite Communication Engineering, Second Edition serves as a textbook for students and a resource for space agencies and relevant industries.

"It's application is industry based. …it will excite readers especially with it empirical examples."

—Kayode Odimayomi, METI-University of Port Harcourt, Nigeria

"The book provides a simple explanation of the very technical aspects of satellite systems engineering. It covers a wide range of topics and includes useful topics of Design of Satellite Links, Satellite Communication Network Access Types and Error Detection and Correction Coding Schemes, Regulatory Agencies and Procedures and Mobile Satellite Systems, which is a recent phenomenon. Very good examples are used to illustrate the design procedures."

—Tokunbo Ogunfunmi, Santa Clara university

Dr. Lefty O. Kolawole received a B.Eng. (1986) degree from Victoria University, Melbourne, and Ph.D. (2000) degree from the University of New South Wales, Sydney, both in electrical engineering. He also received an M.S. (1989) degree from the University of Adelaide in environmental studies. He is the director of Jolade Consulting Company, Melbourne; a chartered professional engineer in Australia; a member of the New York Academy of Sciences, and is a Visiting Professor to the Federal University of Technology, Akure. He has published more than 50 papers in refereed journals and 25 industry-based technical reports covering design, performance evaluation, and developmental algorithms.

The Satellite Communication Ground Segment and Earth Station Handbook, Second Edition (Artech House Space Technology and Applications) 2nd Edition, Kindle Edition by Bruce Elbert Format: Kindle Edition

This updated and expanded second edition reflects the state of earth station design and ground segment architecture. From international telephone network gateways to direct broadcast home receivers, today's broad range of ground systems and devices require satellite communication engineers and business managers to have a broad and sound understanding of the design and operating principles of earth stations and ground control facilities. This book explores the delivery end of the satellite link and its relationship to delivery of services.

Authored by a leading authority in the field, the book provides engineers and managers with the knowledge they need to devise their own approach to implementing and managing earth stations and the overall ground segment. Readers find practical guidance in an array of critical areas, including: preparing requirements, performing preliminary analyses, reviewing hardware designs, managing the introduction of the overall ground segment, and more.

Army Techniques Publication ATP 6-02.54 Techniques for Satellite Communications November 2020 by United States Government US Army Format: Kindle Edition

The purpose of this United States Army Manual, Army Techniques Publication ATP 6-02.54 Techniques for Satellite Communications November 2020, is to educate communicators on the options available when using beyond line of sight satellite communications. This publication includes information for planning, establishing, and operating communications networks with satellites. The principal audience for ATP 6-02.54 is Army professionals and contractors whose duties involve planning, installing, operating, and maintaining satellite communications systems and networks. Satellite communications trainers and educators throughout the Army will also use this publication. ATP 6-02.54 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. ATP 6-02.54 applies to the Active Army, Army National Guard/Army National Guard of the United States, and United States Army Reserve unless otherwise stated.

Service Efficient Network Interconnection via Satellite: EU Cost Action 253 by Y. Fun Hu, Erina Ferro , and Gerard Maral Format: Kindle Edition

A Local Area Network (LAN) is a network usually within a single office or building that links desktop computers with each other and with peripherals such as servers and printers. The interconnect is the electrical and functional association of two different services, often provided by different suppliers, and it is from LAN inter-connection that telecoms operators seek to profit. The application of LAN interconnection via satellite can be used to complement and extend existing terrestrial public access networks through interconnection of clusters of broadband islands (such as LANs and MANs) in remote regions, where terrestrial lines are expensive to install and operate. Examples include:* Hospitals/clinics in remote and rural areas can be connected to the central hospitals in a tele-medicine environment* Remote offices can be connected to the central office to facilitate tele-working* University/colleges can be inter-connected to provide tele-education facilitiesSimilarly, the possibility to provide access to such facilities in developing regions of the world is also viable and particularly attractive in the short to mid-term. Private LAN connection facilities could also be made available to the corporate user, offering the possibility to establish broadband Internet access within a closed user group. Such a scenario could be of interest to the financial sector. By gathering the knowledge and experiences of well-known satellite systems experts from different parts of Europe this comprehensive volume provides detailed analysis on technical

aspects for interconnecting local area network using satellite. Starting from traffic source modelling for different types of applications and services to different types of transmission techniques and networking functions for supporting such services, different case studies are presented to analyse the performance of such technologies.By providing an insight to current and future developments in satellite communications systems and by covering a broad range of materials in technical aspects in relation to satellite communication systems technologies, this volume will be of tremendous use to researchers, academia and industry.* First book to present such a thorough description of the reliability functions of satellite systems* Discusses IP over satellite* Provides a unique analysis and description of different simulation tools that are under development for evaluating the performance of satellite systems* Includes a chapter devoted to traffic modelling for satellite systems* Reviews current research and developments in security and discusses how such security functions can be implemented over satellite networks* Addresses different types of routing strategies and includes three different case studies which have been carried out to analyse the performance of different routing strategies

Where access by terrestrial fibre is not commercially attractive, the use of satellites for the provision of services to remote and less developed regions is recognised as efficient and economical. The EC COST 253 Action was set up to study, define, model and simulate the inter-connection of local area networks through non-geostationary satellites in order to provide globally efficient interactive communication services. Service Efficient Network Interconnection via Satellite provides the results of research activities conducted within the COST 253 framework gathered from European satellite communications experts. Reviews source and traffic models important for the design of network control algorithms

* Covers transmission aspects including modulation and coding schemes, Doppler frequency shift correction and interference modelling

* Discusses different network issues including routing strategies taking into account traffic characteristics and geographic variation in traffic intensity, reliability issues, multicast over satellite, and recent development in security aspects of mobile networks and their applications in satellite networks

* Discusses the technical challenges involved in the implementation of TCP/IP over satellite and the on-going development in mobile IP

* Evaluates different simulation tools for the characterisation of satellite networks and presents the simulation results for networking performance

By offering a wealth of material relating to satellite communication systems technologies, Service Efficient Network Interconnection via Satellite will be of tremendous value to researchers, academics and those working within industry. -- This text refers to the hardcover edition.

Y. Fun Hu is the editor of Service Efficient Network Interconnection via Satellite: EU Cost Action 253, published by Wiley.

Gerard Maral is the editor of Service Efficient Network Interconnection via Satellite: EU Cost Action 253, published by Wiley.

Satellite Data Compression 2011th Edition, by Bormin Huang Format: Kindle Edition

Satellite Data Compression covers recent progress in compression techniques for multispectral, hyperspectral and ultra-spectral data. A survey of recent advances in the fields of satellite communications, remote sensing and geographical information systems is included. Satellite Data Compression, contributed by leaders in this field, is the first book available on satellite data compression. It covers onboard compression methodology and hardware developments in several space agencies. Case studies are presented on recent advances in satellite data compression techniques via various prediction-based, lookup-table-based, transform-based, clustering-based, and projection-based approaches. This book provides valuable information on state-of-the-art satellite data compression technologies for professionals and students who are interested in this topic. Satellite Data Compression is designed for a professional audience comprised of computer scientists working in satellite communications, sensor system design, remote sensing, data receiving, airborne imaging and geographical information systems (GIS). Advanced-level students and academic researchers will also benefit from this book.

VSAT Networks 2nd Edition, by Gerard Maral Format: Kindle Edition

VSAT Networks: Second Edition covers all the important issues involved with the installation of VSAT systems.

Since the first edition was published, the VSAT market has continued to expand steadily. VSAT technologies have advanced, prompting an increase in the take-up of VSAT services.

Offering a comprehensive introduction to the topic followed by a detailed exploration of multiple access protocols, delay analysis and system dimensioning, this edition is a highly relevant update of VSAT Networks. Written by a well-respected and established member of the satellite community, it will be welcomed be academics and engineers alike.

- Covers important issues of services, economics and regulatory aspects
- Provides a detailed technical insight on networking and radio frequency link aspects, therefore addressing the specific features of VSAT networks at the three lower layers of the OSI Reference Layer Model for data communications
- This timely second edition is fully updated with new figures, improvements and revised chapter on future developments

This book will appeal to students of telecommunications, electronics and computer science. Practising telecommunications engineers and technical managers involved in the planning, design and operation of VSAT networks and systems will also find this book a valuable reference source.

Now fully revised and updated, VSAT Networks continues to cover all of the essential issues involved with the installation and operation of networks of small

earth stations called 'Very Small Aperture Terminal'. VSATs are typically one to two meters in antenna reflector diameter and communicate with one another, or with a central earth station called a 'hub', via a relay satellite in space. This informative volume enables the reader to understand how services, economics and regulatory aspects condition the success of such networks.

Key features include:

- configuration and practical applications of VSAT networks
- radio frequency (RF) link analysis, focusing on basic formulae and the evaluation of the RF link performance
- protocols used, with emphasis on the necessary adaptation of protocols used in terrestrial networks
- procedures for the dimensioning of the network according to the type and volume of generated traffic and to the expected quality of service

Written by a well-known, highly respected academic, this authoritative volume will appeal to students of telecommunications, electronics and computer science. Practising telecommunications engineers and technical managers involved in the planning, design and operation of networks and service provision will all find this book a valuable reference source.

This Second Edition has taken full advantage of the author's experience gained from the success of the first edition. The theoretical background has been expanded and the operational contents have been updated in view of recent developments in the field.

Gerard Maral is the author of VSAT Networks, 2nd Edition, published by Wiley.

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Cooperative and Cognitive Satellite Systems 1st Edition, by Symeon Chatzinotas and Björn Ottersten
Format: Kindle Edition

Cooperative and Cognitive Satellite Systems provides a solid overview of the current research in the field of cooperative and cognitive satellite systems, helping users understand how to incorporate state-of-the-art communication techniques in innovative satellite network architectures to enable the next generation of satellite systems.

The book is edited and written by top researchers and practitioners in the field, providing a comprehensive explanation of current research that allows users to discover future technologies and their applications, integrate satellite and terrestrial systems and services to create innovative network architectures, understand the requirements and possibilities for future satellite communications standards and protocols, and evaluate the feasibility and practical constraints involved in the deployment process.

- Provides a solid overview of the current research in the field of co-operative and cognitive satellite systems
- Presents concepts in multibeam and multicarrier joint processing and high performance random access schemes
- Explains hybrid and dual satellite systems, cognitive broadband satellite systems, spectrum exploitation, and resource allocation

Learn to integrate satellite and terrestrial systems and services to create innovative network architectures, enabling the next generation of satellite standards --This text refers to an out of print or unavailable edition of this title.

Symeon Chatzinotas is a Research Scientist at the Interdisciplinary Centre for Security, Reliability and Trust, University of Luxembourg. He has worked on numerous R&D projects and has authored more than 120 technical papers in refereed international journals, conferences and scientific books. He has served as Technical Program Committee member in numerous conferences and he is a Senior IEEE member. His research interests are in multiuser information theory, cooperative/ cognitive communications, and wireless network optimization.

Björn Ottersten is Director for the Interdisciplinary Centre for Security, Reliability and Trust at the University of Luxembourg. As Digital Champion of Luxembourg, he acts as an adviser to the European Commissioner. He has held high level research and teaching positions at various universities, and was Director of Research at ArrayComm Inc, a start-up in San Jose, CA, based on his own patented technology. He has authored over 450 scientific papers, including many award-winning journal and conference papers. He is currently editor in chief of EURASIP Signal Processing Journal. Dr. Ottersten is a Fellow of the IEEE and EURASIP. In 2011 he received the IEEE Signal Processing Society Technical Achievement Award. His research interests include security and trust, reliable wireless communications, and statistical signal processing.

Riccardo de Gaudenzi is Head of the Radio Frequency Systems, Payload and Technology Division at the European Space Agency Research and Technology Centre (ESTEC), Noordwijk, The Netherlands. The division is responsible for supporting the definition and development of advanced satellite system, subsystems and related technologies for telecommunications, navigation and earth observation applications. He has been responsible for a large number of R&D activities for TT&C, Telecom and Navigation applications. He spent one year with Qualcomm Inc., San Diego USA, in the Globalstar project system group. His current interest is mainly related with efficient digital modulation and multiple access techniques for fixed and mobile satellite services, synchronization topics, adaptive interference mitigation techniques and communication systems simulation techniques. He actively contributed to the development and the demonstration of the ETSI S-UMTS Family A, S-MIM, DVB-S2, DVB-S2X, DVB-RCS2 and DVB-SH standards. He has published more than 140 scientific papers and own more than 20 patents.

Kalman Filtering: with Real-Time Applications 5th Edition, by Charles K. Chui and Guanrong Chen Format: Kindle Edition

This new edition presents a thorough discussion of the mathematical theory and computational schemes of Kalman filtering. The filtering algorithms are derived via different approaches, including a direct method consisting of a series of elementary steps, and an indirect method based on innovation projection. Other topics include Kalman filtering for systems with correlated noise or colored noise, limiting Kalman filtering for time-invariant systems, extended Kalman filtering for nonlinear systems, interval Kalman filtering for uncertain systems, and wavelet Kalman filtering for multiresolution analysis of random signals. Most filtering algorithms are illustrated by using simplified radar tracking examples. The style of the book is informal, and the mathematics is elementary but rigorous. The text is self-contained, suitable for self-study, and accessible to all readers with a minimum knowledge of linear algebra, probability theory, and system engineering. Over 100 exercises and problems with solutions help deepen the knowledge. This new edition has a new chapter on filtering communication networks and data processing, together with new exercises and new real-time applications.

To summarize, the authors have succeeded in bringing together the mathematical theory and the needs of practitioners. The newly added chapters, in particular the one on wavelets, give the book a proper finish. For a book of this size, it leaves little to be desired. It presetns a wealth of details while at the same time avoiding unnecessary abstraction. Andreas Ruppin, Berlin, Germany (SSN Stat. Software News, 2000, 34,3-4

Kalman Filtering with Real-Time Applications presents a thorough discussion of the mathematical theory and computational schemes of Kalman filtering. The filtering algorithms are derived via different approaches, including a direct method consisting of a series of elementary steps, and an indirect method based on innovation projection. Other topics include Kalman filtering for systems with correlated noise or colored noise, limiting Kalman filtering for time-invariant systems, extended Kalman filtering for nonlinear systems, interval Kalman filtering for uncertain systems, and wavelet Kalman filtering for multiresolution analysis of random signals. Most filtering algorithms are illustrated by using simplified radar tracking examples. The style of the book is informal, and the mathematics is elementary but rigorous. The text is self-contained, suitable for self-study, and accessible to all readers with a minimum knowledge of linear algebra, probability theory, and system engineering.

Optical Fiber Telecommunications VIB: Chapter 4. Optical Satellite Communications (Optics and Photonics) by Hamid Hemmati and David Caplan Format: Kindle Edition

Satellite-based communication systems of today are increasingly capacity limited. Based on radio frequency or microwave (generically RF) technologies, current state-of-the-art satellite communications (satcom) are often constrained by hardware and spectrum allocation limitations. Consequently, mobile payload sensors and instruments (on satellite or aircraft) are often implemented with restricted capacity to better match that of the host platform. Such limitations are expected to worsen as

future interplanetary, deep-space, and manned missions use more sophisticated data-intensive sensors and as the demand for information—and a bigger return on the space-exploration investment—continues to increase.

Satellite Communication Systems Design 1993rd Edition, by S. Tirró (Editor) Format: Kindle Edition

Writing a comprehensive book on satellite communications requires the com¬ mand of many technical disciplines and the availability of up-to-date information on international recommendations, system architectures, and equipment stand¬ ards. It is therefore necessary to involve many authors, each possessing a good level of knowledge in a particular discipline. The problem of using a coherent and unambiguous set of definitions and basic terms has been solved by including in the book all the background information needed for understanding satellite communication systems, without any major reference to other textbooks specializing in particular disciplines. The obvious consequence of this approach has been the large size of the book, with the advantages, however, of practically complete independence from other books, more systematic discussion of the subject matter, and better readability. After the required background information, emphasis has been placed on the discussion of techniques and system design criteria rather than on specific equipment implementation or description of particular systems. The book may be divided in five parts as follows: • The first five chapters provide most of the required background information. • Chapter 6 is an introductory outline of satellite communication systems. • Chapters 7 to 13 deal with the various aspects of technical system design. • Chapter 14 discusses system economics. • Chapter 15 provides a brief insight into some foreseeable future developments of satellite communications.

Statistical Robust Beamforming for Broadcast Channels and Applications in Satellite Communication (Foundations in Signal Processing, Communications and Networking Book 22) 1st ed. 2020 Edition, by Andreas Gründinger Format: Kindle Edition

This book investigates adaptive physical-layer beamforming and resource allocation that ensure reliable data transmission in the multi-antenna broadcast channel. The book provides an overview of robust optimization techniques and modelling approximations to deal with stochastic performance metrics. One key contribution of the book is a closed-form description of the achievable rates with unlimited transmit power for a rank-one channel error model. Additionally, the book provides a concise duality framework to transform mean square error (MSE) based beamformer designs, e.g., quality of service and balancing optimizations, into equivalent uplink filter designs. For the algorithmic solution, the book analyses the following paradigm: transmission to receivers with large MSE targets (low demands) is switched off if the transmit power is low. The book also studies chance constrained optimizations for limiting the outage probability. In this context, the book provides two novel conservative outage probability approximations, that result in convex beamformer optimizations. To compensate for the remaining inaccuracy, the book introduces a post-processing power allocation. Finally, the book applies the

introduced beamformer designs for SatCom, where interference from neighboring spotbeams and channel fading are the main limitations.

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Andreas Gründinger was born in Landshut (Germany) on October 13th, 1981. After secondary school, he started an apprenticeship as industrial electrician at BMW in Landshut, which he finished with high distinction in 2001. Three years later, he got the university acceptance, again with high distinction, from the local vocational high school. Andreas started his university studies in 2004 and received the B.Sc. degree in electrical engineering and M.Sc.(hons) in systems of information and multimedia technology, both from the Technische Universität München (TUM), Germany, in 2008 and 2010, respectively. From 2010 to 2015, he worked towards the doctoral degree in engineering at the Associate Institute for Signal Processing. He was recipient of the Qualcomm Innovation Fellowship Award in 2012 for his research proposal on coordinated communication in multi-satellite systems, authored and co-authored more than twenty conference papers and a journal paper and wrote two book chapters in "Communications in Interference Limited Networks". Since 2016, he is Development Engineer at the Center of Competence for Digital Signal Processing at Rohde & Schwarz, München, Germany. In 2018, he defended his dissertation on robust beamforming. His research interests include signal processing for wireless communications, with special emphasis on transceiver designs and resource allocation for MIMO systems, robust optimization, local and global optimization, and applications in satellite communication, massive MIMO, and relaying.

Telecommunications System Reliability Engineering, Theory, and Practice (IEEE Press Series on Networks and Service Management Book 21) 1st Edition, by Mark L. Ayers Format: Kindle Edition

Practical tools for analyzing, calculating, and reporting availability, reliability, and maintainability metrics

Engineers in the telecommunications industry must be able to quantify system reliability and availability metrics for use in service level agreements, system design decisions, and daily operations. Increasing system complexity and software dependence require new, more sophisticated tools for system modeling and metric calculation than those available in the current literature.

Telecommunications System Reliability Engineering, Theory, and Practice provides a background in reliability engineering theory as well as detailed sections discussing applications to fiber optic networks (earth station and space segment), microwave networks (long-haul, cellular backhaul and mobile wireless), satellite networks (teleport and VSAT), power systems (generators, commercial power and battery systems), facilities management, and software/firmware. Programming techniques and examples for simulation of the approaches presented are discussed throughout the book.

This powerful resource:

- Acts as a comprehensive reference and textbook for analysis and design of highly reliable and available telecommunications systems
- Bridges the fields of system reliability theory, telecommunications system engineering, and computer programming
- Translates abstract reliability theory concepts into practical tools and techniques for technical managers, engineers and students
- Provides telecommunication engineers with a holistic understanding of system reliability theory, telecommunications system engineering, and reliability/risk analysis Telecommunications System Reliability Engineering, Theory, and Practice is a must-have guide for telecommunications engineers or engineering students planning to work in the field of telecommunications

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"For that reason, this book will be very useful for undergraduate students and practitioners who need a good introduction to, or a refresher on, the reliability aspects of the networks they work with." (Computing Reviews, 14 January 2013)

"This well-organized book compares and contrasts the reliabilities of corresponding components that make up today's major networks as well as the reliability of facilities used to operate them." (Optics & Photonics News, 1 November 2013)

MARK AYERS is manager of RF Engineering at GCI Communications Corp headquartered in Anchorage, Alaska. He has a broad range of telecommunications experience in fiber optics, microwave radio, and satellite network design. Mr. Ayers holds a BS degree in mathematics from the University of Alaska Anchorage and an MS degree in electrical engineering from the University of Alaska Fairbanks. He is a registered Professional Electrical Engineer in the State of Alaska, a senior member in the IEEE, and teaches a variety of courses in the Engineering Department at the University of Alaska Anchorage.

Next-Generation High-Speed Satellite Interconnect: Disclosing the SpaceFibre Protocol – A System Perspective by Pietro Nannipieri and Gianmarco Dinelli Format: Kindle Edition

This book introduces the space community to the novel SpaceFibre protocol, developed under the guidance of the European Space Agency (ESA) as the forthcoming, high speed (Gbps) communication protocol for satellite on-board communication. Since SpaceFibre is expected to follow the success of its predecessor SpaceWire protocol (Mbps), the authors provide a system-level perspective for the end-user willing to adopt this latest technology for future space missions. The authors provide a complete view of the SpaceFibre protocol, together with an analysis of all the necessary hardware and software components to integrate this technology onboard a satellite. The text guides potential system adopters toward understanding the protocol, analyzing strengths, weaknesses and performances. Practical design examples and prototype performance measurements in reference scenarios are also included.

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- Provides technology end-users a comprehensive, easy-to-understand reference for efficient implementation of the SpaceFibre protocol;
- Helps readers understand the main features, possibilities and limitations of the SpaceFibre protocol, guiding them step-by-step in the development of a SpaceFibre-based system;
- Includes state-of-the-art analysis, experimental performance test-campaign results, SpaceFibre network practical examples, interoperability analysis and test vectors.

Pietro Nannipieri graduated cum Laude in Electronic Engineering (MSc) at the University of Pisa in June 2016 and got his PhD from University of Pisa in 2020 cum laude. During his bachelor's degree, he has been a visiting student at University College of London for one year. His interests are digital and VLSI design as well as electronics for space applications. He took part in the 18th and 21st ESA Rexus Program with PHOS team as an electronic engineer and with U-PHOS Team as the project manager. Pietro spent several Months in 2019 as Visiting Researcher in the TEC-EDP Section in ESTEC (ESA), where he carried out different qualification test on the SpaceFibre technology and participated actively to several SpaceWire/SpaceFibre working group. He is currently a Post-doc researcher in the

VLSI lab of the information engineering department, University of Pisa. His work mainly focuses on the development of IPs for satellite onboard data handling, (i.e. SpaceFibre), but also signal processing and Hardware-Cyber-security.

Gianmarco Dinelli received the M.Sc. degree in Electronic Engineering cum Laude from the University of Pisa. He is a PhD candidate of the VLSI lab pf the Department of Information Engineering of Pisa University. His work is mainly related to digital system design, from system specifications to hardware implementation on an FPGA device. His research interests are mainly focused on satellite data-handling subsystem and on FPGA-based hardware accelerators for machine learning on the edge applications.

Luca Dello Sterpaio graduated from the University of Pisa, where he achieved his Master of Science degree in Electronic Engineering in June 2016. After four months as Research Fellow at Dept. of Information Engineering, he enrolled in the University of Pisa PhD program. His research activity is mainly focused on the hardware and software digital design for communications in the aerospace field of applications. He is currently the manager of SpaceFibre based technology at IngeniArs S.r.l. Luca is also a Certified LabVIEW Developer (CLD).

Antonino Marino received the M.Sc. degree in Electronic Engineering from University of Pisa in May of 2016 with a thesis on design and verification of test-equipment for SpaceFibre standard. He is a PhD candidate in the VLSI lab of the Information Department, University of Pisa. He has gained valuable experience on the State-of-the-Art spacecraft's onboard communication standard such as SpaceWire and SpaceFibre. He has considerable experiences in Embedded System development and HW/SW co-design flow. His research interests are focused on the development of innovative test equipment for spacecraft onboard communication protocol and in the development of digital design on different FPGA technologies. He has considerable experience in LabVIEW.

Luca Fanucci received the Laurea and the Ph.D. degrees in Electronic Engineering from University of Pisa in 1992 and 1996, respectively. From 1992 to 1996, he was with the European Space Agency - ESTEC, Noordwijk (NL), as research fellow. From 1996 to 2004 he was a senior researcher of the Italian National Research Council in Pisa. Since 2004, he has been a professor of Electronics at the Department of Information Engineering, first as associate professor and then as full professor. His research interests include several aspects of design technologies for integrated circuits and electronic systems, with emphasis on system-level design, hardware/software co-design and sensor conditioning and data fusion. The main application areas are telecommunications, earth and space vehicles, medical systems and technological aids for disabled and elderly people. He is co-author of over 400 international journal and conference papers and co-inventor of more than 40 national and international patents or patents pending. He served in several technical program committees of international conferences. He was Program Chair of DSD 2008 and DATE 2014 and General Chair of DATE 2016 and HiPEAC 2020. He is a member of the editorial board of IOS Press Technology and Disability Journal. He is a Fellow of the Institute of Electrical and Electronic Engineers and a DATE Fellow.

Satellite: Innovation in Orbit (Science Museum) by Doug Millard Format: Kindle Edition

There are thousands of artificial satellites orbiting Earth. Ubiquitous but mysterious, they are a technological infrastructure in space on which society depends, yet we think of them only rarely – when our sat nav goes wrong, for example, or our tv stops receiving. The story of the satellite is, however, remarkable: an astonishing history of imagination, experiment and ingenuity. At first they symbolized Cold War political prestige, as satellites such as Sputnik, Telstar and Early Bird became household names, but they evolved into cultural signifiers, catalysts for design, even the subjects of pop records. These narratives are brought together for the first time in Satellite, an illustrated history that deconstructs the satellite as a cultural, political and technological artefact.

The book unveils the satellite, once trumpeted as the future present, anew, mapping its formative years to the tumultuous events of the twentieth century, but tracing its roots back to the imaginations and intellects of years before. Doug Millard asks the fundamental questions about those spacecraft orbiting above: what forms do they take? How did they evolve and why? Who required them? What do satellites do, exactly, and how? And how, ultimately, might the satellite have augured a space age that has barely begun, given the high costs of launching that still mitigate against routine access to space? Written in a lively and engaging style, and illustrated with striking colour photographs, Satellite will appeal to the many fans of space exploration.

Published in association with the Science Museum, London.

"Today, satellites are the ultimate example of form following function. A bewildering array exists, but Millard proves a good guide to the various designs and orbits they inhabit. The author has worked at the Science Museum for half the Space Age, his work creating exhibits giving him personal insight into key figures. This well-illustrated book is at its best when he shares such memories, helping personalize an era that, Millard argues, has barely begun." — BBC Sky at Night Magazine

"In this nicely produced book, author Millard uses his expertise to summarize the development of spacecraft. The book covers many different aspects of satellites, including their basic design requirements. . . . Highly recommended as an introduction to satellites in all their various guises." — Observatory Magazine

"Innovations resulting from the use of artificial satellites are a common aspect of everyday life; they are used for communications, television broadcasts, weather forecasting, and global positioning systems (GPS). This book explores the cultural, political, and scientific history of satellites that orbit the Earth and beyond. . . . The work includes many beautiful halftone and color photographs, as well as a time line of satellite history. While the book may be somewhat limited in its approach, space enthusiasts will enjoy it. Recommended." — Choice

"The strengths of Satellite are the clear, accessible exposition of the history, and the rich, well-selected, and numerous illustrations that have been reproduced beautifully (a hallmark of the publisher, Reaktion Books)." — Metascience

"Illustrated with engaging color photographs. . . . Millard does a good job in showing the merit of satellites for cosmic observation and how they are deployed around other planets. The reader comes away from Satellite with an appreciation of how this technology is as much a part of our 'infrastructure' as more earthly engineering creations. Indeed, satellites are so useful and ubiquitous that their number is creating a potential pollution problem in space." — Isis

"This is a fascinating story, not only of satellites themselves but the historical and political context of their birth and development. Through political and other technical developments and drawing on the author's knowledge through personal contacts, we can appreciate how space has come to transform life as we know it today. While great to keep track of the facts and well-explained technology, this is a good read for anyone interested in our use of space." -- Helen Sharman OBE, first British Astronaut

"Satellite provides a highly readable account of how we have come to depend on machines in space for many everyday purposes such as weather forecasting, positioning and TV broadcasts as well as for exploring the universe. Doug Millard traces the story from the time of Newton up to the present day laced with anecdotes and wonderful images that make it a treat to read." -- Pat Norris, author of Spies in the Sky --This text refers to the hardcover edition.

Doug Millard is Deputy Keeper, Technologies and Engineering at the Science Museum, London. He is the author of Cosmonauts: Birth of the Space Age.

Large Antennas of the Deep Space Network (JPL Deep-Space Communications and Navigation Series Book 1) 1st Edition, by William A. Imbriale Format: Kindle Edition

An important historical look at the space program's evolving telecommunications systems

Large Antennas of the Deep Space Network traces the development of the antennas of NASA's Deep Space Network (DSN) from the network's inception in 1958 to the present. It details the evolution of the large parabolic dish antennas, from the initial 26-m operation at L-band (960 MHz) through the current Ka-band (32 GHz) systems. Primarily used for telecommunications, these antennas also support radar and radio astronomy observations in the exploration of the solar system and the universe. In addition, the author also offers thorough treatment of the analytical and measurement techniques used in design and performance assessment.

Large Antennas of the Deep Space Network represents a vital addition to the literature in that it includes NASA-funded research that significantly impacts on deep space telecommunications. Part of the prestigious JPL Deep Space Communications and Navigation Series, it captures fundamental principles and practices developed during decades of deep space exploration, providing information that will enable antenna professionals to replicate radio frequencies and optics designs.

Designed as an introduction for students in the field as well as a reference for advanced practitioners, the text assumes a basic familiarity with engineering and mathematical concepts and technical terms.

The Deep Space Communications and Navigation Series is authored by scientists and engineers with extensive experience in astronautics, communications, and related fields. It lays the foundation for innovation in the areas of deep space navigation and communications by disseminating state-of-the-art knowledge in key technologies.

The ITU and Managing Satellite Orbital and Spectrum Resources in the 21st Century (SpringerBriefs in Space Development) 2014th Edition, by Audrey L. Allison Format: Kindle Edition

Access to satellite orbits and spectrum is managed by the ITU, a United Nations body that strives to extend the benefits of new technologies to the world, while ensuring equitable access to these resources. This book explores how the ITU approaches these dual missions in light of the increasing saturation of the geostationary orbit by a vibrant global satellite industry and the rising interests of developing countries in accessing these limited resources. These issues were the subject of debate at the 2012 World Radiocommunication Conference. This book describes and assesses various regulatory approaches undertaken to manage the increasing requests for access to space and especially access to spectrum and orbital locations in the geosynchronous or "The Clarke" orbit.

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Audrey L. Allison is the director of Frequency Management Services, for the Boeing Company. In this role, she leads Boeing's domestic and international spectrum management in support of Boeing products, testing and operations – including licensing, compliance, and strategic regulatory planning and policy development. She also represents Boeing on a broad range of industry telecommunication policy and spectrum advocacy before the International Telecommunication Union (ITU), the Inter-American Telecommunication Commission (CITEL), and U.S. government agencies, such as the Federal Communication Commission (FCC).

In 2012, Allison was reelected by the ITU Radiocommunication Assembly to serve as a vice-chair of the ITU's Radiocommunication Advisory Group in Geneva, Switzerland, for a second 4-year term. She also serves as a Board Member of the United States ITU Association and as an Alternate Board Member of the Satellite Industry Association. She is the Chair of the FCC's World Radiocommunication Conference Advisory Committee Working Group on Aeronautical, Maritime, and

Radar issues. She previously chaired the FCC Advisory Committee's Regulatory Working Group for the three previous World Radio Conferences. Allison also serves as a member of the State Department's Advisory Committee on International Communications and Information Policy.

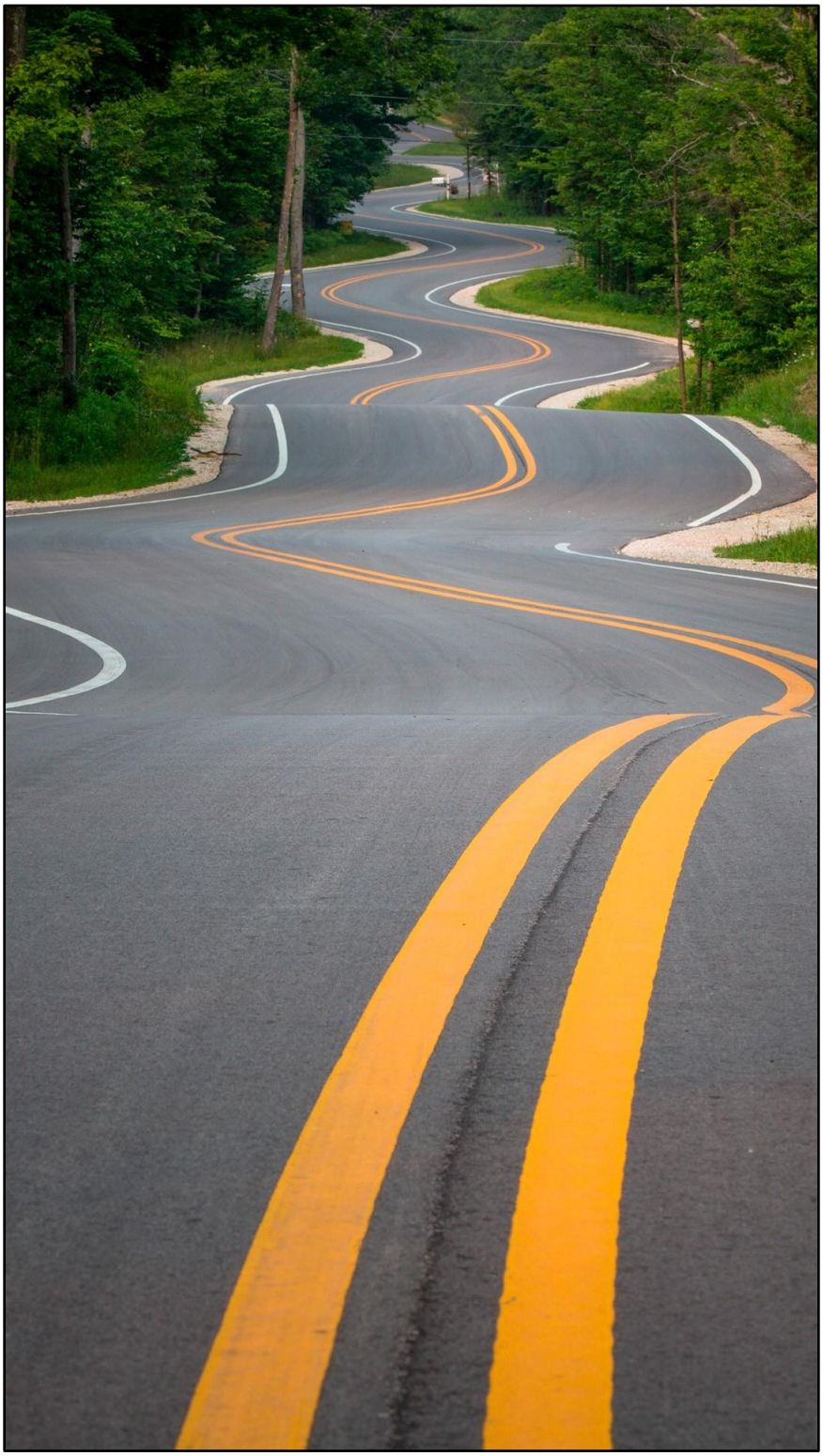
Allison is a member of the Adjunct Faculty of the International Space University in Strasbourg, France and lectures on satellite regulatory issues to McGill University's Institute of Air and Space Law in Montreal.

Before coming to Boeing, Allison held legal positions with the FCC, Iridium LLC and law firms in Washington, D.C. She also was a consultant on international communication policy and regulatory issues to the U.S. Department of Defense.

Allison has a Master of Business Administration, cum laude, from the International Space University in Strasbourg, France; a Master of Law in International and Comparative Law from Georgetown University in Washington, D.C.; a Juris Doctor in Communications Law Studies from the Catholic University of America in Washington, D.C.; and a Bachelor of Arts in Communications from Pennsylvania State University.

Advances in Delay-tolerant Networks (DTNs): Architecture and Enhanced Performance (Woodhead Publishing Series in Electronic and Optical Materials) 1st Edition, by Joel J. P. C. Rodrigues (Editor) Format: Kindle Edition

The book is the end of the road for the Insider series of novels by this author.



Death's Door Curvy Highway, the northern most end of WI State 42
(Photo courtesy of windows10spotlight.com)